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Agriculture.

COTTON-GROWING IN QUEENSLAND.

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"White as a snowflake, warm as May,
Siren of commerce day by day,
In soft serenity upcurled,
She rules the markets of the world."

THE COTTON PLANT—AN IMPORTANT FACTOR IN LAND SETTLEMENT.

Some fifty years since, on the cessation of the American civil war, the cultivation of cotton in Queensland assumed some commercial importance. Belated though the growers were in seizing the opportunity of securing the high values for cotton, the sequence of the fratricidal strife between two sections of one nation, as instanced in the war between the Southern and Northern States of America, this country benefited much by the occasion, ending in dire misfortune to Lancashire spinners when the shortage of cotton brought our countrymen to the verge of famine. These untoward circumstances in America and England compelled attention to the potentialities latent in Queensland in respect to the culture of cotton. The civil war being over about the middle sixties, our farmers, by that period, had scarcely got into a stride in the production of cotton, and not until the Americans had considerably recovered their normal position as cotton growers did we, in Queensland, start to grow this article in considerable volume.

Zenith was reached in the years 1869 and 1870, when in the former year 14,426, and in 1870-14,674 acres were under tillage in the southern districts of this State.

Subsequently a rapid decline eventuated, the chief reason being the rapidly falling market due to the resumption of cotton growing in the war-devastated States of America, added to which were serious troubles due to attacks by the cotton boll worm, and experience being lacking in the treatment of this pest, many growers lost heavily by its ravages.

An added difficulty was the expensive charges, the slow transport in those days by sailing vessels to England, and uncertain delivery; dependent as growers were entirely on sailing ships to carry cargoes abroad. Fibre on which farmers realised up to 4d. per lb. dropped in value to as low as 1d. per lb. for cotton in seed, which naturally discouraged further developmental work in connection with the industry.

THE BONUS QUESTION.

A considerable amount of misconception has gained ground as to the amount of assistance this industry has obtained by bonus from the public treasury. It is frequently asserted that as soon as the bonus provisions lapsed the industry collapsed. Nothing of the kind occurred, for the very sound reason that the bonus provisions of £5 per bale exported had ceased to operate long before cotton growing was discontinued. We found that when the value of cotton was equal to what it has been during the last fifteen years the profits accruing were satisfactory, but a drop to a penny per lb. for raw cotton in seed was largely a non-paying proposition; hence, farmers speedily left off growing the crop. However, the bonus paid, being in the form of a land order to the producer of the cotton, had, indirectly, a beneficial effect on the close settlement of what are now the most prosperous farming districts of Southern Queensland.

Evidence of this may be seen by any traveller through the Logan, Fassifern, and Rosewood farming centres. Here one realises the value of diversified farming, and small holdings furnishing a large population with a profitable means of livelihood.

Most of these areas were selected by farmers who, for their sons, utilised the bonus land order to take up homesteads of from forty to eighty acres, and those districts are studded to-day with comfortable homes and farm plots, due largely to the impetus given to this the best form of home-making by the utility of the cotton plant as the factor in closer settlement.

Hundreds of farmers grew cotton in that period after the lapse of the bonus; hence, much of what is surmised as to the effect of the bonus lapse is entirely mythical.

When a revival of the industry occurred about the year 1890, due to the unselfish efforts of the farmers and mercantile community in Ipswich, whose ambition was to revive the industry not only on growers' account but as relating to textile manufactures, a further bonus was sought for, and after much delay and opposition a proviso was made by the Legislature that on the manufacture of five thousand pounds' worth of calico or other cotton fabrics the money would be paid. This regulation prompted those interested in the industry to establish the Queensland Cotton Manufacturing Company, which, after much effort, was capitalised to a very insufficient amount and started operations at East Ipswich.

After a struggle for about five years, the company ceased operations owing to insufficient capital, but primarily to the apathy displayed by the Government then in power, in not safeguarding the interests of the company by carrying out tariff regulations provided by the Customs Act. This can be best explained by a brief discursive statement of fact. The directors, after some inquiry and tests, discovered that a line of manufacture best and most profitable for the company's activities related to the making of Turkish and Honeycomb towels. The necessary machines were expressly imported from England to perform this work, the incentive being a duty of 15 per cent. on this class of goods, as against a free tariff, or at most 5 per cent., on the other articles made in the factory, which for the most part comprised narrow calicoes, broad sheeting, twills, cellular cloth, butter and cheese cloths; all of superior excellence, which speedily caught the attention of the local trading houses.

Our enterprise in making these towels was, for a period, eminently successful, until importers of cotton textile goods in the State found that by importing towels in bolts, the selvage being uncut, they were classed as piece goods and admitted duty free. This proved the Waterloo of our textile manufacturing at Ipswich, and from that time the plant has been largely scrap iron.

I have emphasised this feature of our manufacturing enterprise in order to correct a false impression that the cotton growing and manufacturing industry failed by inherent economic conditions adverse to the enterprise rather than those which could, by a little business acumen and sympathetic treatment, have been entirely avoided, and a useful industry be continued, particularly as economic conditions have improved in relation to this pursuit.

THE LABOUR ASPECT OF COTTON GROWING.

Perhaps no misconception has taken a greater hold on the mind of the community than the idea that cotton growing is and must be associated with cheap labour, be it coloured or white.

It is eminently true that much fibre is grown under conditions where the cost of labour is low; nevertheless, it is easy to demonstrate that low-priced labour is often costly, as evidenced in the cotton industry elsewhere. This aspect frequently comes under observation, and is instanced in the character of the coloured man in particular, who is held to be the example, *par excellence*, of cheap labour.

Some time ago I was able to show in a letter to the "Manchester Guardian," a leading British manufacturers' newspaper, that their efforts to grow cotton in Central Africa by native labour proved more expensive than was the case in utilising white folk in the industry in Queensland. The same has happened in Papua, where a friend has charge of a cotton plantation, and who averred that native labour, though cheap in cost, was too slow for the work, and who declared that to gather the fibre entailed a cost of 2d. per lb.

Knowing the celerity of the coloured man by personal observation of his work in Queensland, Papua, and New Caledonia, I am confirmed in the idea that the white man has no peer in the cotton field and that it is a crop eminently fitted for white activities, and, moreover, a very profitable one, as present experience clearly demonstrates.

An example came under my notice during a recent visit to the north of Queensland, where a friend, in confirmation of my long-formed opinion on this question, substantiated my contention thus:—He tested the ability of aboriginal labour on a cotton field in the North, and instanced the fact that twenty hands gathered but ten pounds of fibre in two hours. A practical commentary on that is evidenced by a test I made recently in the Maranoa district, when, in association with three juveniles, we picked at the rate of ten to twelve pounds of cotton per hour without undue pace-making. A fair acreage allotable to each juvenile or adult white worker in Queensland for a season's picking would be about fifteen acres for each person able to hustle. This being worth (at pre-war values) from £10 to £15 per acre, will give a hint as to the earnings possible to obtain.

An All White Cotton.

From the foregoing remarks, founded as they are on demonstrable fact, it becomes feasible to accept the idea that in the Commonwealth it is practicable to make of this industry one that will become a profitable avenue of rural enterprise to any who may elect to engage therein. There are various reasons for the contention that this vocation can be carried on entirely by white labour earning a fair remuneration from all its branches, whether it be the rural or textile features of the industry.

I have shown what a factor this pursuit has been in the early settlement of this country. I well remember, fifty years since, raw immigrants, British and Continental, arriving in hundreds weekly, immediately locating themselves in scrub or forest areas, and by means of the cotton plant becoming self-supporting with only self-reliance and the storekeepers' guarantees to furnish the bag of flour, tea, and sugar.

Hundreds of prosperous settlers or their descendants can verify this statement; hence, what is most required to make cotton growing a foremost industry, as it once was, is immigration coupled with a scheme of ready-made farms on which the folk can locate immediately on arrival if they so elect.

A factor evidently overlooked by many who have but a limited knowledge of this question, is the repeated insistence that men must be trained to become successful settlers. This contention is largely discounted by our experience in the early days of this (then) colony. Families arrived who did not know anything of our seasonal or climatic conditions, yet made good, largely owing to the facility with which one can learn how to handle the cotton plant.

An economic feature related to most tropical pursuits is often disregarded, which is, that tropical products on the whole require much less experience or ability to produce than those related to temperate climes. This is patent to any who have travelled in the tropics and who realise with what ease the coloured native gains his sustenance from soil, sea, or palm.

Our only hope in settling a prosperous community on the land and in adequately increasing rural industries is to speedily emulate the American methods of preparing homes for prospective settlers, be they soldiers or civilians. Our national prosperity relates largely to land settlement, without which our vast continent will remain unproductive.

Our Gold Reserves—Where do they Exist?.

The writer has, on many occasions, provoked a smile when using a homely but effective argument in relation to this subject. Some ten years ago, when visiting the Charters Towers district in connection with a movement to advance cotton growing, I pointed out that at the then lower value for cotton, every acre in and around the Towers had under the sod a potential wealth of one ounce of gold annually to the acre clear of the cost of obtaining it.

The comparison has evidently borne no result, for to-day this plant is not in favour although it demonstrates its value by persisting in a volunteer fashion to indicate its adaptability for that region.

Last June, when paying a further visit to that centre, finding the whole place decadent by virtue of the reefs panning out and no further developments in prospect, in order to comfort the few who still realise that if gold in the reef fails, the sod will not do so, I pointed out that at the present advanced value it is quite possible in this area to win not one ounce per acre, but double that amount, free of cost of raising the crop. The farmers in the Ipswich and the Maranoa and other places have, in some instances, raised from £15 to £25 worth of cotton to the acre this past season, the accruing costs of winning this article in each instance being in the vicinity of £6 to £8 per acre, which should more than cover all expenses.

This indicates that in any suitable cotton-growing region it is within the ability of any farmer to win the equivalent of one to two ounces of gold from each acre tilled.

This fact proves how advisable it is to expedite the tillage of the cotton shrub in the common interest.

COTTON A CRUTCH TO OTHER PURSUITS.

Past experience has abundantly demonstrated that this vocation materially assists the development of collateral industries.

This is particularly true of the dairying interests, and speaking from personal experience on this matter, there is clear evidence of advantage to the dairying industry arising from association with the cotton grower.

It was common practice among early settlers to pasture their cows and other stock on the harvested cotton plots, finding therein valuable forage at a period when pasture was scarce.

Our experience was that nothing need be apprehended during the winter period or early spring owing to absence of grass on the ordinary pasture lands. Our fields were picked over by the end of July, or in some instances earlier, when the plantations were available for stock pasture. It frequently happened, despite all the attention paid to tillage, that an abundant weed growth, such as carrots, thistles, and other valuable herbage, would grow in the cotton fields subsequent to the period of laying by the crop, which usually happens when the plant growth interferes with horse or hand cultivation. On these occasions our stock became fat and sleek owing to the nutritious pasture available. Our working horses acquired a sound condition for future work, and our cows rapidly increased the milk supply and put on condition.

Hence dairying is assisted materially by a diversified method of crop raising, and cotton is the most valuable of our crops.

COTTON AND SHEEP.

This combination has much to recommend it to prospective settlers inasmuch as a smaller holding can be successfully used for settlement purposes if sheep and cotton be accepted as the combination relied upon. The same factor holds good in respect to sheep pasturing on cotton fields, as instanced in dairying, and, moreover, perhaps with a greater advantage.

Sheep raising, as is well known, is much stimulated by the nature of the herbage available for the animals. Instances are on record where, in a period of severe drought, the farmer has saved his sheep by the sacrifice of the cotton crop.

This does not mean, however, that the shrubs are seriously affected for the coming crops. Our method, in regions of low frost attack, of growing the plant as a perennial allows of the feeding down of the shrub without seriously depreciating the value of the future yield of fibre. While it is claimed that a valuable asset is thus to hand as a relief in drought periods, it is not by any means claimed that cotton should be regarded as a perfect fodder for stock. All that is intended to convey is, that at a time of dearth in an emergency cotton may be depended on to afford relief when other means are unavailable.

Another factor of value is noted in the phase that cotton induces a new form of herbage, often adding a great improvement to the carrying capacity of the farm. To obtain the best results from cotton and sheep it is expedient to till, every three years or so, a fresh piece of the farm land, so that, by the influence of the plough, the old or unnutritious grass may be supplanted by new and improved forms of herbage.

Cotton seed is well known to have a leading place in foreign countries as an element of edible fat manufacture. Compound lard-margarine making is related to this industry and, strange to say, contrary to general opinion, it is claimed by experts on the question that the extension of margarine manufacture will have a stimulating effect on the dairying industry by reason of the proportion of milk required to make first-grade margarine.

AS HUMAN FOOD.

The American Department of Agriculture, in pointing out the merits of this crop, claims that the nutrition contained in cotton seed is equal to that of wheat.

It is, moreover, stated that in cases of diabetes bread made from cotton seed is a remedy for that dire complaint.

As a stock food for fattening sheep and cattle its merits are not challenged. "Hoard's Dairyman," the leading American dairy journal, recently complained of the local farmer selling his cream and buying margarine for his domestic use.

The electrician has found that the residue from the oil mills, a hitherto waste product, can be and is utilised in insulation work, and that the huge cables which we see cross the city streets owe much of their value as insulators to the processes to which cotton seed has been subjected in the industrial world.

IT IS THE CROP THAT FEEDS AND CLOTHES US.

The United States alone produces from 12,000,000 to 14,000,000 of bales of 500 lb. each annually. About 12,000,000 persons are engaged in the production and handling of this immense crop.

The value of the American cotton crop and of the by-products, such as cotton seed linters, oil, and oil cake ranges from £300,000,000 to £350,000,000 sterling in value.

England imports about £70,000,000 to £100,000,000 worth of fibre every year, not to speak of other materials, such as cotton seed and cotton seed oil.

It is estimated that considerably over 3,000,000 persons are, in Lancashire, directly interested in the cotton trade, and a further 10,000,000 inhabitants of Great Britain are directly or indirectly connected with the industry.

QUEENSLAND'S OPPORTUNITY IS NOW,

when the changing times make it practicable to promote a huge influx of new settlers, as well as to accommodate those who are here who elect to pioneer the country by making suitable provision for the families who may again be encouraged, as in the past, to come and make Queensland their future home, and who would be welcomed, particularly if of our own kith and kin; as was the case fifty years ago when sailing ships landed immigrants by the hundred every week, and who were speedily absorbed, by reason largely of the advantage of cotton-growing being held out to them, who thereby soon made a competence by their industry and thrift.

I have, for reasons not to be indicated, confined myself to generalisations on the vocation. The practical evidence to hand relating to the treatment of the crop in its cultural phases will be amply outlined in a further article.

Suffice it to mention that there are waiting for landless men thousands of acres eminently suited to cotton culture adjacent to railway lines or water transport, which can be placed under this crop at a lower cost than is possible in any other cotton-growing country.

COTTON A DROUGHT RESISTER.

Once the planter has his cotton plants established, droughts can be regarded with comparative indifference. The hardihood of the shrub in this respect has been tested in past seasons, when other crops owing to dry weather conditions have perished, while this plant has flourished, as it is now doing during the present dry time, little affected by the lengthy absence of rain (January, 1919).

Some years ago, in the Central district, during an unusually dry period, when even forest trees dried out, the cotton shrub resisted weather conditions and persisted right through the trying ordeal, thus indicating its value as a reliable crop during unseasonable weather conditions.

Bearing on this aspect of the question, the recent experience of American growers proves the use of the crop in times of drought. Press reports from Texas, the leading cotton State in America, detail a harrowing description of a drought experienced last year. It is said that the large stores of cotton seed meal held enabled stock owners to save a million head, and it is stated that had a further supply of cotton seed meal been available, a further half-a-million head of stock would have been saved from starvation. The few facts here set forth of the value and adaptability of the cotton plant as a factor in Queensland farming activities, prove that in this crop we have a wealth producer, and no time should be lost in bringing under the notice of prospective settlers the eminent value of this most lucrative pursuit.

Next to prickly-pear and Japanese rice paper plants in evidence here, cotton is the best drought-resisting plant hitherto observed.

THE PRESERVATION OF PERISHABLE PRODUCTS WITH BURNT LIME.

By C. B. BROOKS, Instructor in Agriculture, Rockhampton.

Lime is a product that is to be found on most farms, more particularly those on which dairying is engaged in. There are other purposes, not generally known to the man on the land, to which it can be put, besides making whitewash.

That it is an excellent preservative for a number of products, culinary and otherwise, has been the experience of the writer. It has been tested in regard to the preservation of fruits, tubers, and grains. The method adopted will be described by taking a single example from each of the above.

In the storing of various products it is essential that they should, in most instances, have reached the stage of ripeness, or maturity, and moreover that immediately after harvesting they be allowed to undergo what is generally termed the "sweating process." This is the giving off of surplus water, and chemical changes may also take place to a more or less extent.

FRUIT.—ROUGH-SKINNED LEMONS.

These are to be found in abundance in most districts during the cool months of the year, but in the hot summer weather they are generally not procurable. This of course is on account of their poor keeping qualities, more particularly in coastal areas, where, after picking, they will remain fresh for only a very short time.

During the past season rough-skinned lemons, which I stored in petrol tins during August, were found to be in an excellent state of preservation at Christmas. The treatment received was as follows:—

When picked they were spread out in a shaded, airy place for two days, then packed in partially air-slaked lime, the fruits being kept well apart. If close packing is adopted, it will probably be found necessary to repack in about a week's time, more particularly if the skins of the fruit are in a soft, fleshy condition. A wooden case may be used for storage. This can be made fairly airtight by lining or covering with stout paper.

In a check test carried out without using lime, the lemons deteriorated very quickly.

It may be mentioned that Lisbon lemons can be kept fresh for quite a long time, by packing in sand that has been thoroughly dried.

SWEET POTATOES.

It is important that the tubers for storing should be fully matured. This is ascertained by breaking a few and leaving them exposed to the air for about an hour. If ripe, the cut surface should remain white, or nearly the same colour as when cut. If it turns black, or greenish-black, they are not mature.

Sweet potatoes have been kept for six months simply packed in air-slaked lime. Being a bulky product, a test was made last season by using less lime and substituting sand, in the proportion of one of lime to four of sand. The potatoes were first rolled in lime, and packed in a wooden case (not airtight) with the above mixture. At the time of writing (January) they are quite as sound as when stored in August. To keep them fresh for a shorter period, roll in lime and store in a cool dry place.

ENGLISH POTATOES.

Judging by the number of inquiries received, difficulty is often experienced in keeping English potatoes—intended for seed—for an extended period. A cool, well-ventilated building with a dry floor is essential to success. The tubers should be spread out in layers (dusting with lime during the process), then covered up with either very dry sand or a mixture of sand and lime. If rotting is at all in evidence, an increased amount of lime should be used. Where the potato moth is troublesome, and sand only has been used, a thin layer of lime should be spread over the top. All spaces between the tubers should of course be filled by the sand, &c.

PRESERVING SMALL LOTS OF GRAIN FOR SEED PURPOSES.

It is well known that unless special provision has been made in the way of airtight tanks, fumigation, &c., it is a most difficult matter, on the coast, to keep seeds such as cowpea, grain sorghums, maize, &c., free from weevils.

It has been found that weevils cannot multiply in grain unless it contains a certain percentage of moisture. In wheat, for instance, there has to be at least 10

per cent. present. When harvested it invariably contains from 6 to 7 per cent. moisture, and is therefore weevil-proof.

A simple method of keeping the moisture content under weevil requirements is to use a vessel or container as airtight as possible, such as a tank, petrol tin, old cream can, &c., and when storing seeds to include a quantity of freshly burned lime. In the event of the container not being insect-proof the bags containing the seeds should be covered right over with the lime. In fact the lime can be mixed with the grain without detriment. In order to ascertain whether lime would be injurious to vitality a number of maize cobs and grain sorghum heads were buried in partly air-slaked lime, in the month of June. A vitality test was carried out in September, the maize giving 100 per cent. and the sorghums 98 per cent. germination. A further test was made at the end of December with practically similar results.

The cost of the lime used in the preservation of perishable products would be almost nil, as it can afterwards be applied to the land with, in most instances, considerable advantage.

IRRIGATION.

ECONOMIC AND PRACTICAL METHODS—No. 2.

By P. MAHONEY.

COLLECTION AND DISTRIBUTION OF WATER.

When installing an irrigation plant, it is most advisable to secure a plant of large capacity, as it is necessary to irrigate speedily to secure the best results, for cultivation is most essential for successful irrigation, and to secure a thorough cultivation, it is necessary to have the ground evenly watered in quantity and time. Therefore, to be able to irrigate a large piece of ground, it will be necessary to have a fair-sized plant, so that the distribution of water may be on a par with the cultivation requirements. In this manner the cultivation will become sectional.

The disadvantage of a plant of small capacity is that it takes longer for a small stream to water the ground thoroughly, and when it runs for any length of time it is apt to be unevenly watered, as the land nearest the outlet will get too much water before the bottom of the land has had enough. Thus, by the time the land nearest the outlet is fit to cultivate (which will be considerably longer than the bottom portion, on account of it getting more water) the bottom portion will have lost the most of its moisture through evaporation, thus deriving very little, if any, advantage by the irrigation, and overwatering is likely to prove disastrous.

After installing a plant of the capacity required for production of the water, comes the economic means of conveyance and distribution of same, either by the furrow system or by flooding the land.

The furrow system is undoubtedly the best and the most indulged in, but in many cases, such as in growing lucerne and such crops, the flooding system has to be adopted.

For fruits, vegetables, sugar-cane, maize, or other plants that are grown in rows 3 feet or more apart, the furrow system is the most successful way, for it is possible to give the ground a thorough even watering in this manner. After the water leaves the discharge pipe it is delivered into a small tank or well, constructed of concrete or bricks. This tank should be about 3 feet square, and be built to a level higher than the ground to be irrigated so as to enable the water to be conveyed by gravitation from the tank to any part of the ground, and by having the discharge and delivery pipes disconnected, a rush of water and undue pressure are avoided, thus enabling the supply of water to be easily regulated. In this manner water can be conveyed in several directions at the same time, by having two or more outlets in the tank.

The pipes leading from the receiving tank, through which to convey and use the water, should be regulated according to their length, for the longer they are, the greater the fall should be. A quarter of an inch in the chain is enough fall for any distance over 5 chains, and under that less. When a pipe has got a quarter of an inch fall to the chain, it should have valves about every 5 chains for shutting off the water, so as to afford a quick and effective watering and also avoiding any undue pressure. If the pipes are to go over uneven ground, then it is necessary to have the valves closer than 5 chains.

The best means of conveying the water from the pipes is through a canvas hose, varying in size according to the stream that is required. Outlets should be made every 20 feet along the pipe on which to fasten the hose, which conveys the water into the furrow which runs parallel with the main pipe. From this furrow, the water

is allowed to run down the furrows alongside the rows of plants in the required quantity. If the main pipe is sectioned off into 5-chain lengths with a valve, three or four of the canvas hoses can be connected up at a time. By using the hose an enormous quantity of water is saved, which otherwise would be absorbed by the land between the main pipe and the plant, which would be of no benefit, except in the case where fodder is grown. Where plants are grown in rows, a 20-foot headland is required to facilitate turning when cultivating and making furrows for watering purposes.

When the flooding system is employed, no headland is required, for it is not possible to cultivate under those circumstances, as the plants in these cases are grown within a few feet of the main pipe. In flooding beds which are under fodder, such as lucerne, it is advisable to first water the bed which is farthest away from the outlet, the water being conveyed to it through pipes in the division banks, closing up each pipe as the beds become sufficiently flooded. If watered in this manner no surplus water is lying about.

Concrete or even earth channels can be used for conveying and distributing the water on to the land, but under these systems the evaporation and soakage are enormous. On the other hand, where a big stream can be produced at a little lift and cost, such channels would suffice, as a large acreage can be irrigated in quicker time than with the pipes. Where only a small piece of land is irrigated, the pipes would prove the more satisfactory.

(To be Continued.)

AGRICULTURE AT THE PRIMARY SCHOOL.

Mr. H. R. Julien, agricultural engineer, wrote as follows on this subject in the *Revue Générale Agronomique* of February, 1901. The subject being of special interest to an agricultural and pastoral community such as ours in Queensland, we give our readers a translation of the article:—

AGRICULTURAL INSTRUCTION IN PRIMARY SCHOOLS.—THE PROFESSION OF THE AGRICULTURIST SHOULD BE HIGHLY ESTEEMED.—WHAT SHOULD BE LEARNT?—OCCASIONAL AND REGULAR INSTRUCTION.—CONCLUSION.

The principal object of instruction in agriculture in the primary schools should be to cause agriculture to be understood, honoured, and loved as it deserves to be; to elevate the profession in the eyes of the pupils as much as possible; to develop a taste in young people for the profession of the farmer, which is unjustly despised and treated with contempt in certain parts of the country. If farmers are exposed to many reverses, resulting from epidemic diseases, from accidents, from failure of crops; if, during certain seasons of the year, they have to do heavy, prolonged, and laborious work, it is none the less true that those who devote themselves to an intelligent cultivation of the soil find in their labour a satisfaction and pleasure which, other things being equal, one would look for in vain in most of the other professions.

Children in rural districts should learn at their school—when they have finished their term of study, they should be profoundly convinced that the farmer carries on an honourable and independent business; that agriculture is the most important of all national industries; that it is an inexhaustible source of wealth, for it alone produces, whilst other trades confine themselves to transforming the products of the soil and the materials elaborated by plants under the influence of the sun's rays.

To reach with certainty this highly desirable result, the germ of it must be implanted in the mind of the young pupil by giving him correct ideas of the conditions under which the agricultural industry must be carried on at the present day.

There is no one so well able to work upon the intelligence, the tendencies, and the tastes of children as the capable instructor who is imbued with a deep sense of the noble mission confided to him.

To cause agriculture to be esteemed and loved by children, they must be shown how estimable and worthy of their love it is. The profession of the farmer does not solely consist, as some even yet believe, in a routine or in machine-like work which the first-comer can rapidly acquire without any effort by personal experience or by observing how things are done in his neighbourhood. On the contrary, it is a science which must be carried on by intelligent people who know how to get at the why and wherefore of the operations, as numerous as they are varied, which they undertake.

It is not, therefore, sufficient to bring under their notice but to make them see and understand the different kinds of work done in the fields, the orchards, and the farms. It is the most suitable means of making them acquire a reasoning knowledge, a knowledge of daily application concerning the cultivation of various plants, the study of domestic animals, of parasites, of the nature of arable soils, of the value and action of manures, of the multifarious labours of the farm.

It is not necessary to learn everything at the primary school, and no sensible person would pretend to educate the pupils there to become finished farmers. But what may be demanded of them is that at the end of their school life they should possess sufficient knowledge to continue to instruct themselves by the observation and interpretation of such phenomena as frequently present themselves when reading the daily papers, reviews, and agricultural works, by the assistance everywhere given at agricultural conferences by State experts in agriculture, by the dairy experts, by the professors of courses of agriculture for adults, professors of horticulture, of market gardening, of apiculture, &c.

To attain this end, it is not sufficient to let them learn some manual by heart, but it is indispensable to develop in the students a spirit of observation, to inspire them with a taste for study, to make them acquire those fundamental principles which are indispensable to a clear understanding of the subject.

Is *occasional* instruction sufficient to arrive at this result?

Evidently it is not. It is decidedly necessary for the instructor to seize every possible opportunity to instil into the minds of the students useful ideas concerning the farmer's profession, but such instruction must be complete, and it should be preceded by *regular and didactic* teaching.

A rigidly straight course must be adhered to—a logical sequence—in order that the child may not be confused with a mass of jumbled-up ideas which are disconnected, and do not fit in one upon the other. Regular instruction should form the basis of the whole edifice. It comprises the study of the principles of the fundamental laws on which the science of agriculture is founded.

Occasional instruction is the indispensable complement of regular instruction. Its aim is to make itself understood by well-chosen object lessons, by walks abroad, by conversation, by problems, by excursions, by practical work, by experiments. It must force its way into the intelligence of the child, and consequently this theoretical instruction must not consist of lessons "by heart," but it must be digested, assimilated, understood.

One must not deal merely in words or definitions, but the teaching must above all develop in the pupil the ideas, the reasoning powers, the aptitude to instruct himself later on by his own energy and of his own accord. And this is precisely the reason for reducing everything to scientific principles, and of accepting or rejecting good and bad methods according to whether they agree with or are opposed to the immutable laws which regulate the matter and activity of living beings.

It is only in this manner that the primary school will evolve intelligent cultivators of the soil in numbers anxious to follow with determination and prudence the modern methods by which agriculture, forced by necessity, has since a considerable time begun to elevate itself.

Agricultural teaching is too often as wearisome as barren of result, because a wrong direction is taken, because teachers allow themselves to be guided by a defective method. At the same time we do not deny, having seen them at work, that many teachers stand at the head of the noble and important mission entrusted to them, and we do not hesitate to assert that their fruitful lessons and instruction have had their share in the immense progress achieved during these last few years in many parts of the country.

[We could instance several State schools in Queensland where the teachers are carrying out the work of agricultural instruction with eminent success.—Ed., *Q.A.J.*]

HOW THE EXTENSION OF AGRICULTURE BENEFITS THE CITY WORKERS.

How to keep our boys and young men on the land has been a problem which individual farmers have solved for themselves, but which still remains a problem to the generality of them. There was a time in the old country when farms descended from generation to generation, the young people never dreaming of doing anything but following in their fathers' and grandfathers' footsteps, turning and re-turning the furrows as they were turned and re-turned a hundred years before they were born.

Why, then, is it that the farmers' sons and daughters no longer care for what they consider a humdrum life of toil without adequate remuneration? The causes may be found in (*a*) education, (*b*) increased facilities for travelling, (*c*) the attractions of emigration, (*d*) the attractions of the towns.

How is education answerable for the abandonment of a rural life? It is not education itself which is answerable, but it is the kind of education given up till very lately in every school—primary, national, grammar, and private schools—in all Great Britain and her colonies. Nothing has ever been taught in any of them, tending in the remotest degree to educate a lad or a girl to rural occupation. The whole system has fitted the student for nothing else but the professions, for clerks, shopmen, &c. They have learned to be, according to the old schoolboy oracle, either soldier, sailor, parson, tailor, ploughboy, apothecary, gentleman, or thief. Note the ploughboy; no mention is made of the farmer. The boy was not taught anything so low as agriculture. The farmer's boy goes to school. He learns Euclid, Latin, algebra, grammar, geography, probably dancing, and the piano, all things most useful to a farmer. What he has thus imbibed gives him the idea that with these accomplishments he can do better in the city, enjoy more—not comfort, but leisure—and have more pleasures than are possible on a farm; so the deluded youth, deluded and robbed of an honourable, independent profession by those blind guides who professed to fit him for his passage through life, this much-wronged lad abandons the farm and becomes a city office boy or clerk, and he is lucky if ever he rises to be anything but a clerk. What he has not learnt at those schools has been what would have given him a keen interest in the land and its crops, what would have lightened his labour, what would have increased his and his family's comfort, and what would have helped to swell his banking account, and what would have made him for ever independent of those city masters who grow wealthy by the sweat of the brow of their servants.

In this sense, then, we say that education has been one of the factors in drawing the farmer's son from the land.

Next take the increased facilities for travelling. A hundred years ago farmers rarely saw any other town but the nearest market town of their own country. A visit to "Lunnon town," Dunedin, or Dublin was hardly ever dreamt of by the boldest farmer. And if he did travel 100 miles he first made his will, the wife of his bosom and the household generally wept in unison, and if he returned safely he was looked on as a wonderful traveller. In Australia it used to be much the same thing. Before railways were built the roads were mere tracks, all travelling was done on horseback or by bullock dray, bushrangers were not unknown, and living in the larger towns was very expensive. So the plain or scrub farmer only visited the town at which he sold his produce. There was no inducement for the young men to settle in the towns, because there was no opening for them, trade was small, and amusement was rare.

See how things have changed. The railways came along, goldfields, coalfields, opal-fields, tinfields, copper, and, best of all, canefields sprang into existence. All kinds of businesses, trades, and professions offered employment to young men possessing only the education we have indicated. Distance had been annihilated. The educated farmer's son could take employment in the large towns at a low salary, because he was able to travel by rail at a cheap rate and live with his parents. Then he soon imbibed a love of town life, and a dislike for the toil and vicissitudes of farm life. If he were inclined towards mining, the railways, steamers, and coaches carried him quickly and comfortably to many of the gold, tin, or copper fields, whereas in the early days the weeks of dreary tramping to reach his destination deterred him from leaving home.

The British farmer's son inclined towards a life of adventure is induced by the alluring pictures presented to him by the immigration lecturer to leave his home and try fresh woods and pastures new. The unknown attracts him. He is weary of the monotony of old country rural life, and paints a fancy picture of life under sunny skies and under more exciting conditions, not knowing that 'tis but distance that lends enchantment to the view. But what is loss to the British agricultural population is gain to the colonial, for these farmer immigrants usually enter upon farming pursuits in the colonies. Their descendants, however, at the present day, are more attracted by the allurements of town life. The flannel shirt, canvas trousers, heavy bluchers, and slouch hat are gladly discarded for the more elegant costume of the city. The early and late hours necessitated by the routine of the farm are exchanged for the late hours of the city—late to bed and late to rise. The theatres, dances, concerts, exhibitions, and picnics, the afternoon saunterings in the busy street, the convenience of 'buses, trams, cabs, trains, excursion steamers—all these tend to wean the farmer's son from a life of honourable independence to one of ill-paid servitude. Compare the young farmer with the young city clerk or budding civil servant. The former is engaged in a healthy pursuit, in a life-giving, open-air occupation. His house is his own, his land is his own. He owns no man as master. He has no troubles about rent, and very little has he to do with the butcher, baker, grocer, or

draper. On a well-managed farm many household requirements are produced which the town dweller has to pay for. If he wants a holiday of a day, a week, or a month he has no one to consult but himself. His occupation, so far from being monotonous, is one of endless variety. The changes of the seasons, even of the weather, bring constant change to his work. Science and invention have placed powers in his hands which have reduced hand labour to a very limited sphere in the operations of the farm. True he suffers many disappointments. He has to take the chances of drought, flood, caterpillar, locust, parasitic and fungoid diseases attacking his crops, but this only stimulates him to action, and lends additional attractions to his occupation, inasmuch as he is by these troubles compelled to study the remedies. If farmers, taken as a body, are not men of great wealth, they are in comfortable circumstances. They have to obtain advances on their crops, says a carping critic of these lines. Possibly, indeed very probably, this contingency will often arise. But so good is the security offered by the farmer that in all civilised countries of the world (except a few, in which Queensland is included) agricultural banks have been established which make advances to farmers at very low rates of interest, and it is not too much to say that for one farmer who goes into the insolvent court 10,000 shopkeepers, merchants, clerks, middlemen, and other business people of the towns take advantage of the insolvent laws. In conclusion, let us ask what is the result of the exodus of the rural population to the towns? It may be stated in a few words. The additional strength poured into the towns, which, as a rule, are generally overmanned with would-be workers, must necessarily tend to the reduction of wages, to an increase of taxation; and the low rate of wages from which the taxes have to be deducted results in much distress amongst those who are bound by family ties to live as best they may, obtain work as best they may, in cities where the influx from the country has cheapened labour or rendered it almost impossible of attainment.

We set out with the intention of showing "How the Extension of Agriculture would benefit the City Worker." We have shown how the city worker is injured by an oversupply of workers from the country districts. But, with our rich agricultural lands thrown open to selection on easy time-payments, with the repurchase of such fertile estates as the Government has so wisely bought back from the owners to sell again to the farmers, with the removal of any restrictions upon selection, the construction of light railway lines or even tramlines as feeders to the main lines, the sinking of bores, the dissemination of information by means of travelling experts, the removal of prohibitive duties on agricultural machinery, and on everything required by the farmer for conducting his business, the lowering of railway rates on agricultural produce, the distribution of seeds, the importation of new varieties of plants, of stock of all kinds, the establishment of agricultural colleges and of State experiment farms, the free issue of agricultural literature, the holding of annual agricultural conferences—with these and a host of other advantages we could mention, the extension of agriculture must follow as a matter of course, and as thousands of acres of new land come under cultivation the demand for not mere mechanical farm drudges, but for workers on scientific principles with scientific appliances, must at no distant date result in relieving the towns of the best, healthiest, and most honest labourers and mechanics. As a consequence wages in the cities must rise, the cost of living would be reduced, and the up-to-date farmer could afford to pay a reasonably high wage to his men.

How, then, is the depopulation of the farms by the exodus of the sons of the house to be prevented? By affording less facilities for the education of rural children?—by reducing the facilities for travelling? On the contrary, it is by doubling and trebling these facilities that the object is most likely to be attained. It is the class of education that demands immediate reform. The curriculum of the rural primary school should have a totally different trend. Does anybody doubt this? Then, we say, look at the work done by the agricultural colleges of Europe, America and in a lesser degree of Australia. Compare the numbers of those who have attended the higher schools of the ordinary classical or commercial type and the numbers of those who have gone through the three or five years' (in some cases) course of a good agricultural college; then follow the career of each batch of students. Those who have received the stereotyped school training will, taken as a whole (there are very many brilliant exceptions, of course), be found to hold positions in no way comparable to those held by students with the agricultural training. Hundreds, aye thousands, of young men have gone from the agricultural colleges into the world either as farmers of their own land, as graziers, as agricultural chemists, as farm managers, creamery and factory managers. They entered college with these objects in view, and they are successful, independent men. The ruck of the other schools hold their positions on a very precarious tenure. Let a panic occur in the money market, let a European war break out or a financial crisis occur, the farmer sits secure so far as his board and lodging are concerned, although he may lose his savings. The city worker in almost every capacity is what is delicately termed "retrenched"—that is, cut off from his means of livelihood. But he must feed his family, clothe them, pay his rent and taxes. With no employment, no savings to

fall back upon, what remains for him but debt and the insolvent court when the great financial crash occurs? The farmer can live in his rent-free house, he can live on the produce of his land, on his cattle, sheep, swine, and poultry, and has no difficulty in selling enough produce to procure whatever else he needs, for city people and city horses have to be fed whoever pays for the food, and no one but the farmer can supply it.

It may be said that we paint the state of the farmer in too glowing colours. We only state the bare facts. We have tried it for many years, and, therefore, claim only to state the case as it stands. We merely assert that the farmer can live comfortably in times when a city worker would have to live by his wits. We also maintain that the love of a city life is injurious to the State in two ways at least: First, it robs the farm of its best supports. Secondly, it robs the genuine city worker of his just wage by over-supplying the labour market.

Ne sutor ultra crepidam is a very hackneyed aphorism, but we should like to see the farmers' boys act on it. It means "Let the shoemaker stick to his last." For their benefit we will render it thus: "Let the farmer's son stick to his father's farm."

COTTON IN QUEENSLAND.

Since the Department of Agriculture, in order to stimulate the production of cotton in Queensland, undertook to supply seed to farmers willing to give this crop a trial, and established a cotton ginnery in Brisbane, considerable small areas were planted in various southern districts. The Department, besides supplying seed gratis, undertook to take all cotton delivered at the ginnery in William street, making the growers an advance on their consignments, and handling the product on a co-operative basis, when the season's crop was completed, effected the sale, and merely deducting the ginning, baling, and marketing expenses, divided *pro rata* amongst the suppliers whatever profit resulted from the proceeds.

In 1914, 94,445 lb. of raw cotton were received at the Departmental Ginnery, 524 lb. of which were sent to Panama. The balance, 8,921 lb., was ginned and yielded 2,794 lb. clean lint, which was sold locally at 6d. per lb.

In 1915-16, 29,230 lb. were received, which yielded 10,066 lb. of lint, sold at 7d. per lb.

In 1916-17, 118,229 lb. of farmers' cotton, yielded 37,694 lb. of lint, sold at 11d. per lb.

In 1917-18, 166,458 lb. were supplied by farmers, which returned 54,280 lb. of raw cotton, which was sold in the South at 1s. 1d. per lb. In this year the farmers received 4d. per lb. for their raw cotton, and a further sum for linters, which is the small quantity of short cotton left on the seed after passing through the saw-gin. Last year the Department obtained a machine which saved the fibre on the seed, and which added 2,643 lb. to the total for the year.

In the palmy days of cotton-growing in this State (1866 to 1873), when Queensland exported over 2,500,000 lb. in 1871 to London, the growers were quite satisfied to obtain 3d. per lb. for their raw cotton, and that price gave them a better return than any other crop. Certainly, wages and the cost of living were much lower in those days than at present, but even with labour and rations at their present war prices, 4d. per lb. gives a better return than many other crops, especially as the cotton plant will thrive when those other crops are perishing during a drought.

The following figures show that the cotton industry is steadily increasing, and it is hoped that the rate of progress will be maintained until at least the point has been reached when it will be profitable, provided sufficient protection is afforded, for the manufacture of cotton goods, as is now done with woollen goods.

COMPARATIVE STATEMENT OF COTTON CROPS FROM 1914 TO 1918.

Year.	Total Received. lb.	Lint. lb.	Advance per lb.	Price Realised for Lint per lb.	Received by Farmers per lb. Raw Cotton.
1914 ..	9,445	2,794	1½d.	6d.	1.65d.
1915-16	29,230	10,066	1¾d.	6.9d.	2.54d.
1917 ..	118,229	37,694	1¾d.	11d.	3.5807d.
1918 ..	166,458	54,280	2d.	1s. 1d.	4d.

LUCERNE AND LIME.

A complaint about lucerne plants turning white is answered by a correspondent of American experience, who says:—"We have had similar trouble, and we would advise the cutting of the field and the application of crushed limestone or lime in some form. The lime makes the nitrifying bacteria thrive, and they are unable to exist without it. Explain it as you will, it is our observation that, given the proper soil drainage, lime is the important requisite of lucerne growth. We have noted in our own experience and in that of others that a good vigorous stand of lucerne will be secured, and all at once it will suddenly go back and die out. We have never noted this where lucerne was growing on soil supplied with the requisite amount of lime.

"Crushed limestone or marl can be applied to the field after the first crop of hay is taken off, using from one to two tons per acre, as conditions demand. It is the practice of some successful growers to disc or harrow the lucerne, after the second cutting. The springtooth harrow is used for this purpose. If crushed limestone is applied after the first cutting, it is a good practice to disc or harrow the field of lucerne after the second cutting. It might be all right to cultivate the field after the first cutting, but it is a more common practice to cultivate after the second crop is taken off. The lime can be applied as a top dressing in winter, but the sooner the acid condition of the soil is corrected the better it will be for the lucerne.

"When land is sour an application of lime is indispensable. From one to two tons of crushed limestone, or marl, or thoroughly airslaked lime, may be applied per acre. Owing to the caustic properties of burnt lime we are chary of its use, and much prefer to have it air-slaked before putting it on the land. It is better to apply the lime after ploughing than before. If applied to the land after ploughing, the lime has an opportunity to leach its way through the furrow disc, as the upper portion of the soil is most acid, and, therefore, requires the lime."—"The Leader."

CULTIVATION OF WHEAT.

Mr. B. Jewitt, of Buderim Mountain, writes on the utility of the steam plough in wheat growing:—

"In the year 1869, Fowler's Limited of Leeds, Yorkshire, did their first steam ploughing on Mr. Benjamin Atkinson's farm at Manston Lodge, about six miles east of Leeds. The land to be ploughed was 20 acres in extent, and to be ploughed 14 inches deep, and then to be ripped about with a powerful cultivator, and finally harrowed with very heavy harrows. The contract price for the whole work was £12 per acre. The reason for ploughing so deep was to facilitate drainage, as hitherto the wheat in the same field used to perish during winter owing to insufficient drainage. The field was then sown with wheat in the autumn, and the result was a harvest of 48 bushels per acre. Mr. Jewitt was present at the ploughing, reaping, and threshing."

[As a proof of the value of deep cultivation for drainage the experiment was highly successful. The resulting crop paid about the cost of the work. Were its effects only transient, for one season's crop of 48 bushels of grain, the profit would be nil, but when it is considered that the work would be lasting as a drainage proposition and that subsequent crops of 48 bushels might be obtained under ordinary conditions of cultivation, then it will be found to be a very profitable venture.—Ed. Q.A.J.]

SUGAR-CANE SILAGE PIT.

The General Superintendent of the Bureau of Sugar Experiment Stations says that it may be remembered that some time ago a small silo was instituted at the Sugar Experiment Station, Bundaberg, for the purpose of siloing cane tops. These were gathered in the field immediately after the cane was cut and chaffed up and then trodden well into the underground silage pit. As soon as this was completely filled it was weighted down with earth. After an interval of three or four months this pit has now been opened and a trial made of the silage contained therein. The Chemist in Charge of the Experiment Station (Mr. Pringle) states that the Station horses took very kindly to it when mixed with other feed, but did not care for it alone, while on the other hand cattle took to it at once and eat it greedily.

As there is an immense amount of cane tops usually going to waste in the cane-cutting season, it is evidently quite possible in those sugar-growing districts where mixed farming takes place, to silo cane tops and make use of same for feed at a time when forage is scarce. It may, therefore, be recommended to growers having dairy cattle.

Pastoral.

CONCLUSIONS TO DATE UPON THE EXPERIMENTS BY THE DEPARTMENT OF AGRICULTURE AND STOCK IN RELATION TO THE BEST MEANS TO COPE WITH THE MAGGOT-FLY PEST IN SHEEP.

REPORT BY W. G. BROWN, Inspector in Sheep and Wool, who is in charge of the Experiments.

In accordance with instructions I have the honour to submit herewith some further information *re* the results of five years' experimentation, some conclusions drawn from them, and general experience outside the operations.

Investigation prior to the establishment of experiments at Gindie in 1914.—In January, 1913 (*see* report of Messrs. Cory and Jarvis, October, 1913) it was printed in the "Agricultural Journal of Queensland," p. 5: "If dipping does not altogether prevent the attack of the maggot-fly, it certainly acts in no small measure against that pest. . . . . Once a man dips his sheep he will not require to be compelled, the benefits being so apparent."

Illustrative cases of efficacy of poisonous dips.—In the report of the investigation of 1913 above referred to, Mr. A. H. Cory reported on seven stations.

"No. 1.—Dipped 1,000 maiden ewes, hindquarters only, in Cooper's powder dip (no crutching). Only 12 ewes fly-blown in six months.

"No. 2.—Dipped in June, and up to present (13th October) not 2 per cent. fly-blown. When struck, the maggots did not develop and spread as with non-dipped sheep. Last year 80 per cent. struck.

"No. 3.—Dipped in May; very satisfactory results since. Forty per cent. of sheep were fly-blown last year.

"No. 4.—Dipped hindquarters of ewes in Cooper's five weeks ago. None fly-blown since. Those not dipped have been blown. Marked 1,000 lambs in May, sprayed with Cooper's. Only about 1 per cent. have been blown since, and the lesions did not extend.

"No. 5.—Dipped last four years with six or eight weeks off shears. Particulars (this year?) not available.

"No. 6.—Dipped sheep in May. So far very satisfactory.

"No. 7.—Dipped sheep three months off shears in Royal dip. Ten per cent. affected last year. No flies at present."

Similar cases since October, 1913, can be multiplied by hundreds.

The report from which the above was taken, read in the light of five years of experimentation, is as valuable to-day as when issued. It is on the lines of the recommendations issued that the form of the experiments at Gindie was planned.

As shown in previous reports on the experiments several positive results have emerged, and summarised, they are seen to be—

Efficacy of poisonous dips and dressings.—Generally speaking the specifics used with success are more or less poisonous. One or two used with fair results were non-poisonous and easily soluble in water. The drawback to the use of these seems to me to be that, being easily soluble in water, the tropical rains, which fall so heavily in Queensland at times, are likely to wash them out of the wool, and so leave the sheep unprotected.

Efficacy of crutching and jetting.—Ewes about to lamb, or young ewes with more than six months' wool, are very much more liable to fly-attack than other sheep. In the great majority of cases these animals are attacked at the breach. Hitherto crutching has been the pastoralists' standby.

The benefits of this operation are good for a period, according to the season, of as much as three months, but the knocking about of the sheep, and the large amount of skilled and expensive labour required, has made the method almost impracticable to-day, excepting in small flocks.

Efficacy of jetting with poisonous dips.—There is an alternative which, in my opinion, has proved to be quite as good as crutching, and very much less expensive. That is, the method of jetting a poisonous liquid into the breach of the animals at a pressure of not less than 120 lb. per square inch.

Method of using.—It can be used at intervals of three months. I am of opinion that the cleansing effects of the solid jet is a big factor in preventing fly-attack, this benefit being supplemented by the poison lodged in the wool.

In practice, I find that with a race 3 ft. wide and 50 ft. long, three men can jet about 2,000 sheep per day. There are several effective jetting plants on the market.

Destruction of flies by any means.—It has been urged that if the fly be destroyed there will be no necessity for any of the above measures, and efforts have been and are being made to find a good method of destroying flies.

Traps and poison baits are being tried out with more or less success. It is not possible to kill all sheep flies, but they may be very much lessened in numbers by known means. When they are so lessened, it will give their natural enemies a chance to keep the insects down to normality. Sheep will then be much less liable to fly-attack than in the past ten years.

Natural enemies of flies.—A number of natural enemies may be named—

Birds.—Insectivorous.

Birds.—Carnivorous, such as crows, which devour carrion. It is probable that crows make as much carrion as they eat, especially among weak sheep.

Mice.—In the recent mouse plague, mice cleaned out all the maggots in a dead sheep at Roma which was kept under observation.

The Chalcid wasp. It is only one means of keeping flies in check. Mr. Jarvis's report re discovery of Chalcid wasp.—

Parasites.—These, in the form of a Chalcid wasp, were found in the Longreach district in October, 1913, by Mr. Edmund Jarvis, who stated in his report in December, 1913:—"At Talleyrand I was fortunate in finding unmistakable evidence of the presence of a parasite of C. Rufifacies affecting a large percentage of the pupæ of this fly found in a dead sheep. The carcase was nearly dried up, and all insects emerged, so I collected a few hundred living pupæ and larvæ close to Longreach in the hope that some would be found to be parasitised. On the 29th October scores of hymenopterous parasites, belonging apparently to the Chalcidæ, emerged from these pupæ, all being of the one species—a small shining black wasp 2½ mm. long with legs (excepting femore) and basal joint of antennæ light yellow. Its small size and general structure indicate that it is specially fitted for crawling among wool or other substances in search of its hosts. No secondary parasites have appeared to date."

Chalcid wasp alone is not able to keep flies in check.—There is no doubt, therefore, that the Chalcid wasp is a natural enemy to the sheep fly, yet in the very district where Mr. Jarvis discovered the parasite in 1913 to be numerous and active, up to 80 per cent. of the flocks had been struck by flies. Notwithstanding other claims, this discovery is considered to be the first announcement of the Chalcid wasp parasitising the blowfly. New South Wales is pinning its faith to the action of the Chalcid wasp, but it is considered here to be only one means of many lying ready to hand. Our experiments show that poisonous dips will not only kill the maggot flies, or rather prevent the maggot from maturing in great numbers, but benefits the fleece in no small measure. This is an outstanding feature of the trials.

Arsenic in its crude form as a dip or dressing.—Arsenic in its crude form as a dip and dressing is coming much into use. Results in the trials are good, especially at Dalmally, Roma. Its use, in my opinion, requires a good deal of experiment yet, not to prove its efficacy as a fly-killer and maggot-killer, these effects are undoubted, but enough is not known as to its effects on the health of the sheep.

Formula of an arsenical dip.—I have a formula which was used in England against the fly for over thirty years, yet on one occasion a large number of sheep were killed by its use. The formula is—

White arsenic, 50 lb.; Caustic soda, 4 lb.; Carbonate of soda, 20 lb.; Soft soap, 35 lb.; Sulphur, 30 lb.; Water, 25 gallons (Concentrate).

Dissolve the arsenic by boiling with alkalies, add the soft soap, and lastly the sulphur. Mix one gallon of this concentrate with 59 gallons water. Dip for one minute.

Arsenical dip not suited for haphazard methods of dipping.—I do not think that crude arsenic as a dip should be used unless with great care and from an experimental view. As a dressing applied to only the breach of a sheep, perhaps it may do no harm, but extended trial is essential. Dipping, as a rule, is carried out in a haphazard method, especially in the admixture and replenishing of the vat with fresh concentrate. Who knows the strength of a dip after a number of sheep have been through it? How much of the solids is taken from it, and how much left in the vat after, say, 500 sheep have gone through? Who ever tries the strength during operations? I have never seen it done, and that is why wool is sometimes damaged and sheep semi-poisoned. Arsenic in its crude form would be much more dangerous than dips from a reliable maker. So many people are using arsenic dissolved with alkalies to-day that I had to take it into consideration. Up to now it has been effective and has not hurt either sheep or wool.

Twice and thrice dipping.—One experiment at Gindie of twice and thrice dipping has shown excellent results. The sheep were dipped in a poisonous dip with two months', six months', and eight months' wool. The broker's report was good as regards the fleece, the sheep came through the fly season well—twenty-nine strikes of fly on individual sheep out of 240 during a period of ten months.

Influence of rainfall on fly.—There is no doubt that the incidence of rainfall governs the activity of the maggot-fly.

Proprietary dips which have been proved effective.—In the last trials the following dips were used and found effective as dips against the fly:—Mallinson's, Quibell's, Royal, Cooper's, Little's (poisonous), Fli-ma-gol (poisonous and oil dip), Kiltick (poisonous).

Are flies local, or do they travel to a bait over great distances?—It has come to be believed by many practical men that flies are very local; that is, they stay where they are bred. It is a common experience to see the sheep in one paddock show a big percentage of fly attack, and in an adjoining one a comparatively low one. This matter is being investigated by a skilled entomologist. Of course, flies will follow sheep into a paddock until they have served the purpose of their being—the perpetuation of their species; but they pick up the flies where flies are principally bred—*i.e.*, camping places, waterholes, shearing-sheds, lamb-marking yards, &c., and so spread them.

No specific has been discovered to prevent sheep from being attacked.—It has been found that up to date nothing has been found, poisonous or non-poisonous, which will prevent flies from striking sheep, although claims have been advanced by many persons that their specifics will *prevent* fly-attack if the sheep be treated with them. This has not been proved in practice. The most that can be expected of any dip or dressing is that when a fly deposits its larvæ on the wool, the maggots will find an uncongenial feeding ground where a dressing or dip has been applied. In illustration:—

Illustrations as to amount of protection.—Some results given by the latest experiments at Gindie and also at Dalmally show, for some of the dips and dressings, that as high a percentage as 32 per cent. of the trial number were struck over a ten months' trial. When the analysis was consulted, however, it was found in one specific case that, of the sixteen sheep (out of fifty) struck, no fewer than ten had been struck by flies at different times, and the affected patch had dried off before the maggots could possibly have matured. In the controls, which were quite untreated, 57.3 were struck at one time or another during the ten months, and showed only two dried off in the same way. This is a striking illustration of the effects of a poisonous dip. It also shows that even the poisoning of wool does not protect a sheep against fly-attack. Sheep dips also benefit the wool. Some of the dressings other than poisonous dips do not.

Inquiry as to the presence of a disease in some years.—A question which is being investigated is:—Why is it that in some years even a slight infestation will cause fever and death in the animal, while in other years (1917 and 1918 to wit) the whole body of the animal may be involved without loss of life? Is it possible that there is a specific organism which is epidemic, or is there a specific fly which is not active in all years?

The influence of ill-health on the incidence of the maggot-fly.—It is undoubted that a sick sheep is far more liable than a healthy one to fly-attack, and for that reason all sick sheep should be isolated from the flock when flies are active.

It is certain that a flock which is suffering from stomach worms, for instance, will have a more serious attack than a sound flock. For that reason sheep suffering from internal parasites should be regularly drenched with the departmental arsenical drench.

Crossbreds much less liable to attack than merinos.—It is certain that crossbreds do not suffer in nearly the same degree as merinos from fly-attack, and wrinkly merinos suffer more than plain-bodied sheep. It seems, therefore, that density of wool to an excessive degree is an inducing cause of fly-attack. Figures are before me which show at Dalmally the order is wrinkly Merino sheep, plain-bodied Merinos, heavy-wooled crossbreds, light-wooled crossbreds, in degree of susceptibility to fly attack.

In regard to sex, maiden ewes, ewes, hogget rams, aged rams, and wethers in that order are susceptible to attack, maiden ewes being the most susceptible in any breed.

Normal seasons when sheep are most liable to fly-attack.—Spring, autumn, wet winters, summer. In dry weather flies are nearly quiescent.

DROUGHT-RESISTING SHEEP.

When the South African Government took over the administration of the South-Western African Protectorate, which first, as German South-West Africa it has conquered, it discovered (writes W. G. Davis in the "Town and Country Journal"), a certain number of Karakul sheep, which the Germans had imported from Asia, finding them entirely suitable for the dry arid lands of their new possession. These sheep are, as far as African experience goes—and those who have seen the Afrikander, the Persian, and the Namaqua sheep living in the desert country of the north-west of the Cape Province, will know the extent of that experience, the finest drought-resisters in the world. Indeed, it is said they can live for a long time on nothing, but, at any rate, they remain alive during a severe drought long after all other sheep are dead. The ewes at such times cannot be expected to rear lambs that will grow into weighty sheep, but, as will presently appear, it is not so heart-breaking to have to cut the throats of the lambs of these sheep as it is of other breeds. However, it is not merely their drought-resisting qualities that make them valuable. They are good mutton sheep, and their hair will bring, at pre-war prices, from 4d. to 5d. per lb., which is not a bad return from animals that will thrive in droughty and barren country. Yet even so, they would not be worth much notice if this was all they had to offer. The real value of them lies in the skins of the lambs, which provide the Astrakan fur, which, at normal times, makes the lamb's pelt as valuable as the whole grown sheep—his mutton and hair together—and it is more than likely that this is a moderate estimate of his value.

Attempts have been made to cross these sheep with the merino, but have failed. Crossings have been more successful with kindred types of sheep, such as are haired instead of woolled. It may be possible to procure and bring to Australia specimens of this breed for trial in Queensland, but not if the South African Government pursues the same conservative policy they did on the exportation of ostriches and Angora sheep. In contrast to their action may be pointed out that of Australia letting high-class merino stud sheep be sold to South Africa for the building up of their merino flocks.

THE MAGGOT-FLY AMONG SHEEP.

Inquiries made from representative Fell-side farmers, owning both mountain and inland flocks, as to the alleged prevalence of maggot-fly to an unusual extent, did not produce corroboration (says the "Yorkshire Post"). It was stated that, so far as farmers on the Cumberland length of the Pennines were concerned, they had not found the plague of maggot-fly worse than usual. There was, however, a remarkable increase in the species of fly which preys chiefly on the heads of sheep, and that is causing great trouble to farmers, and much suffering to the animals. Quite half the sheep in an auction mart ready for slaughter had oiled rags tied about their ears and heads as preventives, and to give relief. A curious feature is that this fly seems to have a special liking for horned sheep. A large Cumberland farmer stated that he had scarcely a horned sheep which had escaped attack.—"Veterinary News." England.

Dairying.

The past season (1918) is to be considered highly favourable from a dairy farmer's point of view. Practically all dairy districts participated in abundant rainfall during the early months of spring, with the result that pastures of a succulent nature were soon in evidence. The dairy herds responded with yields of milk in keeping with the ample supply of grass made available to them, and frequent thunderstorms and general rains maintained the grass lands in a moist condition, and prevented the grasses from wilting until late in the autumn.

The total quantity of milk produced within the year was in excess of that of the former twelve months. No change occurred in the uses to which the milk was diverted, the milk being utilised either for domestic purposes, for the production of butter, conversion into cheese, or for condensing purposes.

In a general sense the industry continues to expand, although, through circumstances incidental to the war, dairying has been confronted with difficulties, and has also enjoyed conditions of a favourable character.

Early in the season a deal of uncertainty prevailed as to whether a satisfactory means could be devised for the disposal or conveyance overseas of the surplus in dairy produce from Australia. The paucity of oversea liners fitted with available refrigerating space was really the dominating factor underlying the position. However, representatives of the various interests connected with the industry in this State, acting in conjunction with others of similar calling in the Southern States, finally arranged a sale of the surplus for the season in both butter and cheese to the Imperial Government, at a price appreciably higher than the average rate prevailing during pre-war years, but at a figure lower than that realised for butters exported during the former season.

One of the conditions of sale provided that payment for dairy produce sold to the Imperial Government was to be made against grade certificates attached to cold store warrant. This proviso overcame a good deal of anxiety that existed concerning the matter of finance of the season's output—a matter of extreme importance in its bearing upon the stability of the industry, as manufacturing companies generally engaged in comparatively large businesses seldom have at command capital adequate to meet the contingency of paying monthly for supplies of milk or cream, unless the companies can in turn realise upon or obtain liberal advances against the manufactured products when placed in cold stores.

The Commonwealth Government acted as agents for the Imperial Government on lines somewhat similar to those under which the Queensland Government had acted for the Imperial authorities in the case of the cheese exported from this State during the former season.

In quality the butter submitted for export was quite equal to that of the previous year. The classification of the butter coming under the notice of the grading officers showed an increase in the percentage of butter worthy of being included in the category of first grade.

The reduction in the number of vessels available for the conveyance of butter overseas led to quantities of butter being held in cold stores here for comparatively lengthy periods prior to exportation. This, in turn, caused congestion, and the cold storage space ordinarily at the disposal of shippers of dairy produce was insufficient to meet the demands made upon it. Fortunately for the industry, it so happened that the export season for meat opened much later than customary, and by this means it became possible to arrange temporarily for the cold storage of a large quantity of dairy produce in the refrigerated chambers of a conveniently situated meatworks, and the flush of the dairy season was over before the use of these cold chambers had to be relinquished. Each year continues to furnish a demonstration of the inadequate cold storage provisions now existing at this port, and, as stressed in previous reports, the provision of additional cold storage accommodation for dairy produce is necessary for the welfare and expansion of the dairy industry.

Towards the end of the season a considerable amount of cold-stored butter was released for shipment to Southern States, and as cold storage space was not available upon the coastal steamers, the butter had of necessity to be carried as ordinary cargo, and when exposed to such unsatisfactory conditions in transit, the delicate and highly perishable nature of butter asserted itself, and as a consequence, complaint was raised as to the quality and condition of some of the butters consigned interstate. These butters were drawn from the "butter pool," and neither the vendors nor those to whom the butter was supplied, were prepared to recognise that deterioration in the quality of the product was inevitable under the extraordinary conditions under which the butters were shipped. For several years past a similarly unsatisfactory state of affairs has enveloped the interstate trade in Queensland butter, and there will be a continuance of the trouble until a normal shipping service is restored. Frequent attempts have been made to place the responsibility of the deterioration in quality upon the shoulders of those who primarily carried out the classification of the butter upon entrance into cold store, rather than ascribe the reduction in quality of the butters consigned interstate to the obvious cause. In innumerable instances, the unshipped balances of similar brands of butter to those consigned interstate have been examined and check-graded, and invariably the result has been that the butters treated as the nature of the product demands were found to be of the quality indicated by the class-mark affixed by the examining officer.

THE USE OF LIQUID MANURE AND HOW TO PREPARE IT.

By K. J. A. SYLVA, in "Journal of the Ceylon Agricultural Society."

The use of liquid manure is of special importance in gardens, especially the section devoted to vegetable-growing, and every gardener should be taught how to prepare and apply it. A natural and very effective liquid manure consists of the drainings of cattle sheds, stables, dung heaps, etc. Such drainings should, however, be diluted, according to strength, before application.

Liquid manure has special advantages for garden crops, its stimulating effect on which being generally very noticeable. The fertilising ingredients of a manure can generally be absorbed by growing plants more readily in a liquid than in a solid form. Manure in a solid state can be applied to the soil before the seeds are sown or seedlings planted, but subsequently it cannot be dug into the soil without some interference with the roots of the growing crop, even in the case of well-established plants. It is partly on this account that liquid manure is so valuable.

For pot plants and flower beds I have found liquid manure has very beneficial effects on the plants and flowers. The solid manure originally applied to the soil gets in time exhausted by the growing plant and it is at this stage that more nourishment is required, the soil becoming poor and incapable of maintaining the plant in a healthy and vigorous state. Liquid manure, which is easily applied, comes to the rescue and remedies the defect.

In the cultivation of celery, rhubarb, cucumber, tomatoes, balsam, gloxinias, begonias, salvias, &c., liquid manure has been used with excellent results. In short, all flower-plants, vegetable crops of a quick-growing nature, and pot-plants of all kinds require treatment with liquid manure to ensure the best results being obtained.

MODE OF PREPARATION.

There are two methods of preparing liquid manure:—(1) Take a bucket of liquid drainings from the manure pit and mix it with twice its quantity of water and apply on the following morning, after allowing the sediment to settle down. During wet weather the dung heap drainings may possibly be applied with safety without further diluting. (2) Put a bucketful of fresh cattle dung in a jute hessian bag and place it in a large tub containing six buckets of water, and stir well with a stick two or three times a day for about four days. Let it settle, and, when clear, dilute once more with six buckets of water; there will then be no coarse sediment to soil the foliage or blossoms, the efficacy remaining unimpaired. It is a very safe method to water the plant with manure water and pure water alternately.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, DECEMBER, 1918.

The laying for the month of December has been very unsettled. Up to the 20th very poor work has been done in the case of a large number of pens, but during the last eleven days a marked increase took place. The weather has been exceptionally trying, hot days prevailing throughout the month, which have found out the weak points in a number of the birds. Taken on the whole, the birds are looking well, and the hot weather has not had the bad effect one would expect in their appetites. A. E. Walter's F bird produced the possible for the 31 days; while D. Fulton's A hen completed a fine continuous run of 74 days in succession on the 15th of the month. No deaths have occurred, and only one bird has been removed from its pen for sickness. Broodies have not been quite so plentiful, and it is satisfactory to note the short time it has taken the birds to come on to lay after leaving the broody coop. The following are the individual records:—

Competitors.	Breed.	Dec.	Total.
LIGHT BREEDS.			
*Dixie Egg Plant	White Leghorns ...	120	1,257
*G. W. Hindes	Do.	127	1,179
*E. Chester	Do.	124	1,173
*Tom Fanning	Do.	126	1,118
*C. P. Buchanan	Do.	116	1,105
*W. Becker	Do.	120	1,104
*G. H. Turner	Do.	109	1,093
*Geo. Prince	Do.	104	1,093
*G. Howard	Do. ...	106	1,081
*Mrs. L. Henderson	Do.	113	1,073
*W. Lyell	Do.	11[illegible]	1,070
*E. A. Smith	Do.	103	1,046
*L. G. Innes	Do.	104	1,034
*Oakland Poultry Farm	Do.	95	1,033
*R. Holmes	Do.	104	1,028
*C. Knoblauch	Do.	79	1,024
*Dr. E. C. Jennings	Do.	119	1,015
B. Caswell	Do.	114	999
*O.K. Poultry Yards	Do.	104	998
*Quinn's Post Poultry Farm	Do.	108	989
*Range Poultry Farm	Do.	108	979
*Thos. Taylor	Do.	126	977
J. J. Davies	Do.	118	976
Harold Fraser	Do.	119	954
*Mrs. A. T. Coomber	Do. ...	104	944
*Homalayan Poultry Farm	Do.	109	925

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Dec.	Total.
LIGHT BREEDS—*continued.*			
*J. M. Manson	White Leghorns ...	111	920
*J. Zahl	Do.	92	895
Mrs. L. F. Anderson	Do.	120	895
*Mrs. R. Hunter	Do.	121	887
Mrs. A. G. Kurth	Do.	127	881
*C. Porter	Do.	82	878
O. W. J. Whitman	Do.	102	874
*T. B. Hawkins	Do.	123	847
Geo. Trapp	Do.	125	840
*J. W. Newton	Do.	92	832
S. Wilkinson	Do.	106	832
Shaw and Stevenson	Black Leghorns	108	829
H. B. Stephens	White Leghorns ...	102	829
Progressive Poultry Pens	Do.	128	814
G. Williams	Do.	112	812
H. F. Britten	Do.	103	806
B. Chester	Do.	126	799
R. T. G. Carey	Do.	84	794
P. O. Oldham	Do.	121	787
W. A. Wilson	Do.	126	752
A. W. Walker	Do.	117	730
HEAVY BREEDS.			
*Nobby Poultry Farm	Black Orpingtons ...	105	1,120
*D. Fulton	Do.	116	1,024
*A. E. Walters	Do.	99	995
*R. Burns	Do.	112	991
*E. Morris	Do.	85	988
T. Hindley	Do.	103	974
*E. F. Dennis	Do.	66	954
*Mars Poultry Farm	Do.	89	932
*W. H. Reilly	Chinese Langshans ...	106	906
*W. Smith	Black Orpingtons ...	104	906
A. Shanks	Do.	106	883
E. M. Larsen	Do.	101	859
*J. W. Macrae	Do.	78	854
T. W. Lutze	Do.	109	822
*F. A. Claussen	Rhode Island Reds ...	89	712
W. J. Mee	Black Orpingtons ...	51	666
H. Puff	Rhode Island Reds ...	85	643
Jas. Fitzpatrick	Do.	103	642
Totals	...	6,932	60,671

* Indicates that the pen is engaged in single hen test competition.

RESULTS OF SINGLE HEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
Dixie Egg Plant	189	204	228	194	211	231	1,257
G. W. Hindes	228	195	183	200	193	180	1,179
E. Chester	204	194	183	213	193	186	1,173
T. Fanning	197	175	204	149	198	195	1,118
C. P. Buchanan	166	187	186	186	197	183	1 105

RESULTS OF SINGLE HEN TESTS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—*continued.*							
W. Becker	186	188	165	202	168	195	1,104
G. H. Turner	127	147	203	196	231	189	1,093
Geo. Prince	164	199	175	198	176	181	1,093
Geo. Howard	172	176	188	200	168	177	1,081
Mrs. L. Henderson	186	161	183	147	203	193	1,073
W. Lyell	175	194	192	171	170	168	1,070
E. A. Smith	154	200	183	167	185	157	1,046
L. G. Innes	186	196	223	117	127	185	1,034
Oakland Poultry Farm	150	173	185	183	175	167	1,033
R. Holmes	184	188	161	168	154	173	1,028
C. Knoblauch	186	163	191	165	144	175	1,024
Dr. E. C. Jennings	149	211	180	153	175	147	1,015
O.K. Poultry Yards	150	180	187	149	179	153	998
Quinn's Post Poultry Farm ...	198	153	153	135	196	154	989
Range Poultry Farm	91	203	146	181	176	182	979
Thos. Taylor	135	177	167	151	172	175	977
Mrs. A. T. Coomber	144	182	157	167	120	174	944
Homalayan Poultry Farm ...	183	156	140	130	169	147	925
J. M. Manson	193	167	186	128	112	134	920
J. Zahl	186	146	171	166	134	92	895
Mrs. R. Hunter	138	163	95	149	172	170	887
C. Porter	130	151	155	155	110	177	878
T. B. Hawkins	169	125	161	133	126	133	847
J. W. Newton	162	188	97	115	153	117	832
HEAVY BREEDS.							
Nobby Poultry Farm	217	193	175	113	207	215	1,120
D. Fulton	207	157	158	160	128	214	1,024
A. E. Walters	140	190	131	187	180	167	995
R. Burns	148	172	141	155	214	161	991
E. Morris	142	154	179	196	179	138	988
E. F. Dennis	191	141	159	103	188	172	954
Mars Poultry Farm	167	176	144	161	140	144	932
W. H. Reilly	160	162	154	115	133	182	906
W. Smith	211	158	100	144	132	161	906
J. W. Macrae	104	121	158	141	167	163	854
F. A. Claussen	123	120	116	128	132	93	712

DOES POULTRY FARMING PAY.

By A. V. D. RINTOUL, Assistant Poultry Expert, Victoria.

The fact that this question has appeared at some time or other in most poultry journals published in every corner of the globe is, of itself, sufficient reason why a careful analysis of the prospects of the industry is, at this crisis in the world's history, eminently desirable. Primary production must form the basis of our future success, and no nation can afford to neglect any branch of the rural industries in which profits may accrue.

It is desirable, in the first instance, to determine what is actually meant by the term "Poultry farming." The main source of income undoubtedly should be derived from the production of eggs for commercial purposes, and while this end is being achieved considerable profits may at times be made by those meeting the requirements of certain branches of the industry, but these side-lines must remain permanently subsidiary to the determining point—Does egg production pay? Failures must be accounted for more fully than successes require to be. Considerably more than a competence is gained by those engaged in the following branches:—Stud breeding

(which includes the sale of baby chicks, &c.), custom hatching, the sale of proprietary foodstuffs, the manufacture of articles of equipment, such as incubators, brooders, and the like, literary work in connection with the industry, and lastly—though none too remunerative—instructional and advisory work. All these sources of income are, however, in the long run dependent upon the success or otherwise of the endeavour to produce commercial eggs profitably. Failures are all too frequent, and their causes and methods of prevention are therefore entitled to a close analysis.

Failures are almost invariably due to one or more of the following causes:—First and most important, *lack of experience;* second, *lack of capital;* third, *lack of health;* and a fourth cause may be added, lack of aptitude for the business. Quite recently a well-known institution desired to have one in whom it was interested started in poultry keeping, largely on the ground that the mentality of the individual concerned was too low to permit him to take up any other work. No greater mistake could be made than to consider poultry keeping the proper outlet for the fool of the family. Apart from the aptitude to carry on any commercial undertaking successfully, there is required an ingrained love of live stock with the ability to get the best return from them, besides a general knowledge of food values, building construction, bookkeeping, and banking, together with some elementary anatomical and medical experience.

Lack of experience in any of these matters may prove the poultry-keeper's undoing, yet, fired with enthusiasm, which is perhaps a polite way of expressing "through foolhardiness," the beginner rushes in, and may be, owing to the blandishments of some agent, buys land in an unfavourable situation, proceeds to erect unsuitable housing, acquires stock from an undesirable breeder, or makes a start at the wrong time of the year. Failure results, but this does not mean that the query, "Does poultry farming pay?" is to be answered in the negative.

Lack of capital is the next barrier to success. The land may be suitable, the shedding correct, the stock of high quality, but the available funds are insufficient to tide over the necessary period until enough stock come into full lay at the right time of year to more than balance the ledger. This want of sufficient capital also prevents the best being got from the undertaking, as suitable lines of foodstuffs cannot be purchased under the best market conditions; young cockerels are sold too soon owing to the lack of capital for foodstuffs, or in consequence of insufficient shed accommodation to enable them to be held pending the time of most advantageous marketing; eggs have to be disposed of for cash as laid instead of being held in cool store until the dearer time of year.

Lack of health is perhaps the most tragic cause of failure, those who are compelled on this account to lead an out-door life finding that at certain times of the year the work is more arduous than they are, by nature of their ailment, able to perform.

We now arrive at the point where the question can be put—Given sufficient experience, the necessary capital, and good personal health, does poultry farming pay? To this there can be only one answer, "Yes, it undoubtedly does." As to how the capital and good health may be acquired is not a direct concern of the Department of Agriculture, but the necessary experience can undoubtedly be gained by spending at least six months, and preferably a year, at some place where the business is already being made a success, and, unless a business is a success commercially, there is some element of doubt as to which is actually meant by the term "taking in" students.

WHAT PROFITS CAN BE MADE.

On this point there is a wide divergence of opinion, and because a certain profit per head can be made from 20, or even 200, birds, it by no means necessarily follows that proportionate results will be obtained from 2,000 or 20,000 birds. Estimates are almost invariably based on the returns from the sale of eggs, less the cost of feed, more or less neglecting the rental value of the land, interest and depreciation on buildings and equipment, and the labour involved.

A careful study of the egg-laying competitions during the past few years reveals the fact that it is possible to get a return of seventeen dozen (204) eggs per bird in a period of twelve months from 600 or more pullets, and that these eggs are worth, on an average, 1s. 2d. per dozen all the year round, so that the competition income per bird may be stated, roughly, at 19s. 4d., against an average cost of feed—in war time—of about 9s. 4d. Consequently, the competition profit over feed has been about 10s. per head, but it would be fatal to consider such return as net profit on a commercial plant. Whatever may be the circumstances of the selection of competition birds, they undoubtedly are considered at the time to be the pick of the flock, and not representing the general average. Further, no account is taken of the cost

of rearing a pullet up to the time she arrives at the competition, from which it may be seen that an estimate of 20s. profit over the feed bill *for the laying year* for every three pullets—*i.e.*, 6s. 8d. each, is much more nearly correct than to foolishly expect 10s. per bird. Even this 6s. 8d. per bird, however, is not net profit, because the cost of rearing to the laying stage usually exceeds the market value of the light-breed birth after her laying year, and no allowance has been made for interest on capital expended on house, land, shedding, and equipment, nor, in the case of light breeds, for the cockerels, which at times fail to realise the actual expenditure upon them. Probably, therefore, it is much more reasonable to assess the real profits at 5s. per bird over the entire flock.

This estimate will eventually prove of greater value to the industry than any higher one that could be made, as it should not only act as a wholesome check upon the inexperienced speculator, who is easily carried away by incorrectly worded pamphlets, but also act as an inducement to everyone to keep, at least, a few fowls, if only for the profitable nature of this undertaking. The suburban dweller using household scraps can materially reduce the feed bill thereby, and no farm should ever be considered complete without, at least, 100 or 150 fowls. There are a large number of suburban homes which are actually being paid for by the profits made from poultry, while the wages earned are meeting household expenses.

When the United States of America declared war, the sum of £30,000 was at once appropriated for itinerant lecturers to develop the poultry industry alone, which was then worth £140,000,000 per year, or, roughly, £1 8s. per head of population. In Victoria, the industry is worth about £2,146,000, or, roughly, £1 10s. per head of the population, and the expenses connected with the industry have been drastically curtailed since the war.

SEPARATION OF THE SEXES.

A point on which every stress should be laid—the separation of the sexes. Infertile eggs are the foundation of the market egg trade, and if all eggs marketed were non-fertilised, our egg production would increase in value from 10 to 25 per cent. Again, no bird will reach the utmost perfection in size and vigour unless separated from those of the opposite sex at an early age. No cockerel will be half so good for table if allowed to run with females as if separated when young. Separate the sexes and reap the full benefit of your labour and feed outlay.

We may be accused of promoting production at the expense of sales of the poultry raised. It is not true. If all the stock raised were of prime quality, our markets would be fairly well supplied.—"Garden and Field."

RECORD PRICES FOR FARM PRODUCE.

The second week in January was notable for the number of records broken. Each morning saw fresh records at the Brisbane Produce Markets. The majority of the farmers are losing heavily by the drought, but a few fortunate ones are reaping large profits. One truckload of lucerne chaff was sold for the record price of £150 at one day's sale, while other sales were made in proportion. The top price was 17s. 4d. per cwt., secured for a choice line from Harrisville, while another nice line from that centre changed hands at 17s. 1d., Laidley chaff bringing 17s., and other sales being effected at prices ranging from 16s. 1d. to 16s. 9d. Every line submitted was sold out. These prices are approximately £1 per ton above those of the previous day. Mixed chaff rose about 10s. per cwt., a line from Wilson's Plains being disposed of at 14s. 6d. per cwt. Lucerne hay was passed in at an offer of 11s. 6d. per cwt., and a line of onions from Forest Hill fetched 12s. 6d. per cwt. Oaten chaff was firm, and medium quality stuff was disposed of at 10s. 7d. and 10s. 8d. per cwt., one line being passed in at 10s. Maize advanced a further half-penny per bushel, the only line submitted being sold at auction at 8s. per bushel. About ten other truckloads were in the market, but these were either sold privately or put into store. A new record for potatoes was established, prime tubers from Killarney realising 32s. per cwt., and a lot from Summit 30s. Inferior, small potatoes were knocked down at an offer of 15s. 9d. On the following day, potatoes were sold at 34s. per cwt.

Horticulture.

TO AID THE AMATEUR GARDENER.

The following useful notes on gardening were published in the Brisbane "Daily Mail" of 11th January, and are well worth noting by amateur gardeners:—

In the cooler parts of the State there may be sown this month—pansies, sweet peas, stock, candytuft, mignonette, poppies, dianthus, anemones.

In the coastal districts—asters, balsams, celosias, salpiglossis, amaranthus, portulaca, marigolds, salvia, zinnias, coreopsis.

For pot culture—primula, St. Paulia, cinerarias, gesneria, schizanthus, streptocarpus.

In the vegetable garden—cucumbers, cauliflowers, cabbages, silver beet, marrows, pumpkins, tomatoes, kohl rabi, lettuce, beetroot, lima beans, squashes.

This is cheerful weather in which to write about gardening. The lawns will keep brown and the aster beds will demand constant watering. Lettuces refuse to do anything but run to seed, and one must have the patience of a Chinaman to produce beetroot and tomatoes for the clamouring cook. But enemies keep the amateur from getting fat. If he had no Water Board that cut off his supply from 3 p.m. till 9 p.m.; if he had no scorching sun; if he had no pumpkin beetles and no cabbage grubs, life would become too easy for him, and he would have to throw up gardening for some more vigorous game like bowls. Let us be thankful, therefore, that we have our enemies.

Let us show that we know how to get flowers in drought time by sowing more salpiglossis and more calliopsis and more zinnias. If these be sown now they will make gay the garden for the balance of summer. Portulaca thrives on little water, but asters, amaranths, and celosias demand much of it. Without an abundance of water and a rich soil, asters will come to nothing, but give them a soil that is full of humus, deep, cool, and moist, and they will give generously of their beauty. This writer has two large beds of asters at the present time. One is gay with the finest blooms he has ever grown; the other is a disappointment and an ugly jest. The difference has origin in about six barrow-loads of cow manure that were dug into the good bed somewhere about last June.

Preparation is the thing. Thinking and working ahead bring results in gardening.

It is not too early to think of the sweet peas that are to be grown. In the cooler parts of the State sweet peas may be sown at the end of this month; so may stocks, candytuft, dianthus, mignonette, poppies, and such bulbs as the anemones and ranunculi. Toowoomba and Downs gardeners get ahead of us in this respect, and, to give them the praise to which they are entitled, they make the most of their opportunities. There are some great amateurs west of the Range.

Down on the coast we must wait a while before we sow sweet peas, but we can get the ground ready. We can make the trenches and fill them with the manure that is to put four blooms on each stem, and make the stems twelve inches long. Beds must be prepared for stocks, and they, too, must be rich. What is the use of gardening at all unless it be done well? What is the use of growing scraggy things, when high-class blooms may be produced? What is the use of growing miserable vegetables, such as can be bought from the corner shop, when it is possible to grow toothsome vegetables, that will bring father home to dinner regularly every night? Rich soil, good drainage, ample water—these are the needs.

We could say these things over and over again—rich soil and ample water—and three parts of the amateur gardeners would keep on growing plants in poor, gravelly soil with a minimum of moisture. Why? Rich soil is within everyone's reach. The poorest soil may be made rich. Cowpeas grown on it and dug in will add humus and nitrogen. Seedsmen will supply superphosphate. The leaves that are gathered around the garden, much of the kitchen refuse, will add humus. It may be possible to add stable manure in plenty. Even the refuse from the tanneries, if well rotted, provides the humus to turn poor soil into soil that is possible for gardening.

The first need, therefore, in planning an autumn garden is to prepare the soil in advance. When that is done we shall be ready with ideas as to how it should be planted.

Tropical Industries.

THE CASTOR OIL PLANT.

From reports received from different parts of the world, there would appear to be a strong movement in various agricultural districts in favour of the cultivation of the castor oil plant, and apparently the matter has been taken up by the Advisory Council of Science and Industry, in Melbourne. The Council received a letter in September last year from Mr. Daniel Jones, Brisbane, on the subject, and also some seeds of the Eureka castor plant. This letter and the seed were handed to the Lycett Proprietary Company, Limited, in Melbourne, where the seed was tested in the laboratory, and Mr. Jones received the following letter from the firm:—

"30th October, 1918.

"Dear Sir,—The Advisory Council of Science and Industry, of Melbourne, have handed to us a copy of your letter, dated 11th September, to Dr. H. C. Richards, Bureau of Science and Industry, Brisbane, together with sample of Eureka castor seed. We have read your letter with interest, and have had the sample of seed tested in the laboratory.

"We note that you submitted a sample of this seed for analysis in Brisbane last year, and the result given was 59 per cent. of oil. This is indeed a very high percentage, and the seed would be worth the top market value. A test of the seed which we have put through in Melbourne shows that the seed contains only 45.9 per cent. of oil, but at the same time we would say that when the seed reached us same appeared to be in a very dry condition, and, perhaps, it was very old. The result of 45.9 per cent. in the laboratory test is not very good, and a good seed which can be worked profitably should always show over 50 per cent. of oil in the laboratory test. Apart from this the oil obtained from the seed seems to be of excellent quality, having an acid value of only .09 per cent. The value of this seed, c.i.f.e. Melbourne, to-day would be about £20 per ton, and we will be prepared to pay this price for any quantity that can be obtained for us in Queensland, provided same is delivered before the end of the first six months of next year.

"We are sending you per even mail a sample of castor seed which we are at present working on and which is obtained from India, and also a sample of castor seed which we have been in the habit of using and which has been obtained from Java.

"Yours faithfully, LYCETT PROPTY., LTD.

"30th October, 1918."

In August, 1918, the "Agricultural News," Barbados, published a very interesting address on the subject, delivered on 2nd August by Mr. A. E. Collens, Superintendent of Agriculture for the Leeward Island, to the Antigua Agricultural and Commercial Society, much of which is here reproduced, under the title of

THE CULTIVATION OF THE CASTOR OIL PLANT AND THE PREPARATION OF THE OIL.

According to DeCandolle, in his book "The Origin of Cultivated Plants," the castor oil plant is a native of Africa, although it is now naturalised throughout the tropics.

The oil has been employed for various purposes from the earliest times. It is especially valuable at present as a lubricant for fast moving machinery, particularly for aeroplane motors, owing to the fact that it is unaffected by a wide range of temperature.

The medicinal use of the oil is well known, but it is also valued in India as an illuminant, burning with a minimum production of soot. It is also used in leather dressing and for fixing alizarine red in the dying of cotton.

The leaves of the plant are employed in rearing a certain type of silk-worm in India, and recently attention has been paid to this matter in Trinidad. The leaves are also fed to cattle in India, and are said to make excellent forage.

With regard to cultivation, castor seed requires much the same attention and cultural methods as cotton. It thrives best on a rich, well-drained, sandy loam, and will not do well on heavy wet soils, or ill-drained, swampy lands. The root penetrates deeply, and therefore the land requires to be deeply ploughed and well worked.

Castor seeds have an extraordinary vitality; seeds known to have been kept for fifteen years in a stoppered bottle have been sown in Queensland, and have produced healthy plants.

Under normal conditions germination is slow, and the seeds when sown may take a more or less prolonged time to germinate. In modern practice it is advocated that the seeds should be softened by having hot water (almost boiling) poured over them, and being left to soak for twenty-four hours before planting.

The seeds are usually planted 6 feet apart each way, three or four seeds in a hole. They usually germinate within ten days. When the plants are 8 to 10 inches high they are thinned out to one stem in each hole. In the experiments in Antigua the seeds were planted 4 feet by 5 feet. If extensive cultivation is undertaken, a space should be left every eighth row, to allow for the passage of a wagon or cart to collect the seed in harvesting. About 8 lb. to 10 lb. of seed are required per acre.

In from three to four months the plants commence to bear, and will continue in bearing for at least three months. In the tropics the castor plant is a perennial, but it is questionable whether under cultivation it is desirable to allow the plant to continue growing after six months. As the plant ages it is liable to be attacked by scale insects, and apart from that, the difficulty of gathering the crop, and the diminished yield indicate that at the end of six months it should be ploughed up. If left alone, the plant would grow to an inconvenient height. It should therefore be topped by pinching back the main stem when the plant is about 2 feet high; this will cause the plant to throw out more fruit spikes. When the capsules turn brown it is time to harvest the seed. This is done by cutting off the spikes, and removing them to a barn to dry. The seeds should not ordinarily be allowed to dry on the plant, as in some varieties the pods are very apt to burst open automatically.

Several methods are adopted for removing the woody capsule.

In the United States the spikes are spread out on a drying ground to a depth of 6 inches or 1 foot, according to the weather. This drying ground may be either covered or open; the floor should be clean swept or boarded; and it should have a low wall or fence to prevent the seeds from scattering when the capsules burst. If out of doors, means should be available for protecting them from the weather, *e.g.*, by drawing them into heaps and covering them if rain threatens.

The spikes should be turned over frequently in the sun; the capsules soon burst, and in four or five days they will have shed their seed. The seed is then winnowed free from the husks.

In the Bengal gaols the splitting of the shell is done with a machine, which consists of two smooth iron rollers about 2 feet long, placed parallel to one another, and working towards one another by a simple arrangement of cog wheels. One of the cylinders or rollers is fixed, the other movable by a screw adjustment. By means of the latter contrivance the space between the cylinders can be regulated to the required distance, the space being increased or diminished according to the size of the seed about to be split. The great point is to give the seed sufficient squeeze so as to split the shell without crushing the kernel. The seed can then be winnowed by hand or by a mechanical shaker.

Mr. Archibald Spooner, several years ago, while in Antigua, experimented in castor oil cultivation and devised a machine with a knapping action, consisting of two horizontal superimposed wooden discs; the top of one was fixed and the lower one revolved. The capsules were fed in on the centre, and travelled along grooves until they finally came in contact with the fixed top disc, when the knapping action caused them to split open.

The yield per acre varies with the different kinds of seeds, and also with the type of land. In Madras, where over 500,000 acres are planted in this crop, the normal return in dry lands is 200 lb. to 300 lb. per acre, while in more favoured localities up to 700 lb. are obtained. In Texas and Florida yields as high as 2,700 lb. per acre are stated to be obtained, while the average yield in the United States varies from 700 lb. to 1,600 lb. per acre. In Colombia 2 lb. per plant is stated to be the average yield, which appears to be somewhat high; 1 lb. of dried seed per plant being nearer the usual quantity.

The following table represents some yields obtained in the Leeward Islands in recent years:—

CALCULATED YIELDS PER ACRE.

Variety.	Antigua.			Nevis.
	1911.	1912.	1913-14.	1917.
	lb.	lb.	lb.	lb.
Ricinus communis (major)	—	—	—	550
Ricinus communis (minor)	—	—	—	460
Zanzibarensis	980	390	1,040	650
Native large	—	—	—	780
Native small	—	—	—	475
3172	1,280	450	400	
3173	—	420	560	
3175	900	—	—	
3176	780	330	460	

The yield varies greatly, but this may be partly due to seasonal changes. The rainfall in 1912, for example, was abnormally low, the average being 32 inches, as against a normal average of 45 inches for forty-four years.

Two types of seeds, large and small, are met with usually in commerce. The large type yields a slightly larger percentage of oil, but the oil extracted from the smaller type is considered more valuable, and is especially used for medicinal purposes.

Recent examinations in the Government Laboratory, Antigua, of types of castor seed obtained locally, indicate the following oil contents in the whole seed (unshelled):—

	Percentage of oil.
Small local type	49.0
Large white, slightly speckled seed	56.5
Large Ricinus Zanzibarensis	55.2
Large Communis major (brown speckled seed)	55.8

Castor oil requires considerable purification after expression to free it of albuminous compounds, gummy substances, &c. The following is a crude method which is sometimes employed in these islands. The seed is heated in a pot, and then pounded in a mortar. The pounded mass is then placed in boiling water, and well stirred till the oil rises and is skimmed off; a fresh supply of boiling water is then added, and it is boiled for the second time to recover any remnants of the oil. The oil is then boiled to evaporate any water it contains. This also helps to volatilise acrid principles. The pan is at once removed from the fire when the last drop of water has been evaporated, so as to prevent scorching or burning of the oil.

In the United States the seeds are cleaned from fragments of capsules, &c., but are not decorticated like cotton seed, nor crushed between rollers as are most oil seeds, but pressed whole. The usual process is to express the oil cold, by gradual pressure under a powerful hydraulic press. In the United States of America single pressing is generally used, the cake being trimmed, and the edges re-pressed with fresh seed.

The oil as it flows from the press is a whitish liquid containing starch, albumen, and mucilage, which are subsequently separated by careful clarifying and refining.

In the United States of America 32 per cent. is the average amount of oil expressed from the seeds, the beans containing a total of 45 per cent.

In England the industry is chiefly centred at Hull, where, after cleaning, the hulls are removed by a slight crushing, and the seeds pulped. The oil is then expressed in hydraulic presses, and afterwards refined with fuller's earth and filtered through a filter press. The press cakes are afterwards steamed and re-pressed, and yield a lower grade of oil.

An interesting feature to West Indian planters is the experimental trial in India of the Anderson Oil Expeller, a type of oil extractor which has been recently erected in S. Vincent, and which has been found to give excellent results in the manufacture of cotton-seed oil in that colony. Trials with the Anderson Expeller in Mysore in 1915 gave a yield of 44.3 per cent. with seed containing 47.2 per cent. of oil, the residual cake containing 5.05 per cent. oil, which is considerably less than with other types of presses.

The principal by-product of the industry is the castor cake or pomace; this has no feeding value owing to noxious substances contained in it, and is only used as a fertiliser. The toxicity of the cake is due to the presence of a poisonous nitrogenous principle, ricin, which is not an alkaloid, but belongs to a class of unorganised chemical ferments termed phytalbumoses. Ricin is extremely poisonous, 9.3 milligrammes (.14322 grain) will kill a dog. Curiously enough, fowls are fairly resistant to this poison, and castor cake can, to a certain extent, be fed to them with impunity. Researches are being made in methods of removing this toxin by treatment with high pressure steam. As a fertiliser, however, the pomace is highly valued, and is largely used in India.

In India the greater bulk of the Madras output of pomace, some 80,000 cwt. in 1914-5, is shipped to Ceylon, to be used as a fertiliser, and fetched from 75s. to 100s. per ton in 1916. Its present value in Great Britain is £16 per ton.

In connection with the recent boom in castor seed production, it may be noted that over 50,000,000 lb. of seed were imported into the United States of America in 1916. With regard to West Indian and South American exports, Puerto Cabello in Venezuela exported 185,463 lb. in 1917, and recently Colombia sent two shipments of 62,000 lb. of seed to the United States. A contract of 500,000 bushels (roughly 25,000,000 lb.) of seed was placed by the United States Government with a local firm in San Domingo in 1917.

In London, February, 1918, the price of castor oil was £80 per ton (about 9d. per gallon), and of castor seed £37 per ton (about 4d. per lb.). In the United States of America the price in New York, June, 1918, for castor oil was 29c. to 33c. per lb., as compared with 9c. to 11c. per lb. in 1904.

A cable message was received from India on 29th July to the effect that the Indian Government had prohibited the exportation of castor oil. This will mean that the already restricted supply of castor oil will be still more restricted, and the price will rise to a very much higher figure than at present.

These seeds were given to us by the late Government Botanist, Brisbane, Mr. F. M. Bailey, and on being planted in poor soil near Brisbane, germinated and developed into fine healthy plants over 10 feet in height, which produced a heavy crop of seed. Later on, the spikes were attacked by some insect pest, and were totally destroyed. Ed. Q. A. Journal.

COCO-NUTS *OR* RUBBER—WHY NOT *AND* RUBBER?

A question that is now receiving very serious consideration, the "Indian Planters' Gazette" tells us, is whether coco-nut or rubber planting is more profitable. A few years ago, during the great rubber boom, rubber appeared to be more favourable than coco-nuts, but with the depletion of the world's supply of fats the position has been reversed, and the general opinion is that coco-nuts will, when shipping is more normal, become a profitable investment. There is no lack of demand for the product, and the price in London is about £45 per ton, against £90 or £92 at Marseilles. In view of the altered circumstances, some rubber companies are seriously contemplating the substitution of coco-nuts, and it will not be a surprise if very shortly we have a great coco-nut boom. The many uses of this palm and its by-products are safe guarantees of the great future before the industry. All the same, we (*i.e.*, "Tropical Life") have no hesitation in saying that he will be an extremely foolish man who would cut out well established rubber even for possibly equally remunerative coco-nuts. "A bird in the hand &c." Because markets drag now that does not mean that they will always do so. On the contrary, the very causes that are damming up the demand and keeping down prices for raw rubber now will cause the sluice gates of the world-demand to swing open all the wider when the war is over, and, *above all*, rubber estate owners must remember that, whilst coco-nut planters have several rivals in palm oil, ground-nut, soya oil, &c., Hevea rubber stands alone, and always will do. Plant coco-nuts, therefore, as much as you like, and so have a second string to your bow; that is good business, but to talk of cutting out good rubber . . . . . But maybe it is not good rubber, nor a good manager either, and in that case, of course, we do not want to meddle.—"Tropical Life."

Animal Pathology.

REPORT ON MR. MUNRO HULL'S CLAIMS REGARDING TICK-RESISTING CATTLE.

The following was inadvertently omitted as an appendix to Mr. C. J. Pound's comments in last month's Agricultural Journal:—

ANSWERS TO THE 25 CLAIMS ADVANCED BY MR. MUNRO HULL FOR THE COWS "CLOVER" AND "TINKERBELL."

1. These cattle never mature more than a few odd female cattle ticks during the whole course of a year.	In the last experiment the cows "Clover" and "Tinkerbell" were placed in a ticky paddock for 27 days, and then removed to and kept in stalls for 25 days, during which time no less than 230 fully-matured ticks were obtained from "Clover" and 860 fully-matured ticks from "Tinkerbell." To be brief, as 230 and 860 fully-matured ticks were removed from "Clover" and "Tinkerbell" respectively in 23 days, it is absolutely incorrect and misleading to say that these cattle during the whole course of a year never mature more than a few odd female ticks. It might also be noted that large numbers of engorged ticks dropped off and were found on the floors of the stalls, but are not included in the totals given above.
2. They never require any attention as regards the tick.	As a result of 27 days' exposure in a ticky paddock, these two cows became so badly tick-infested, and so suffered from tick-worry that dipping or spraying would certainly have been justified.
3. They never need dipping and may be turned out on *any* country for indefinite periods without suffering *any* ill-effects from cattle ticks.	
4. They are regularly and heavily infested (or attacked) by millions of larval ticks.	The degree of infestation depends entirely upon the conditions of environment.
5. With the exception abovementioned these infesting ticks die before becoming more than just visible to ordinary eyesight—*i.e.*, when still very minute.	This is incorrect. *Vide* answer to No. 1.
6. Probably in the pupa stage of development.	
7. They remain at all times sleek and clean in appearance, without blemish of any description.	This is directly opposed to my finding, as on each occasion that "Clover" and "Tinkerbell" were exposed to ticky pastures they became covered with sores, while portions of the skin were denuded of hair.
8. That this peculiarity is transmitted in *every case* to their progeny.	"Clover's" calf, which is now over 13 months old, has been more or less heavily tick-infested since it was a few weeks old. It is unfortunate that "Tinkerbell's" calf, which was dropped at Traveston (Mr. Walker), has not been received at the Stock Experiment Station from Traveston.
9. That this peculiarity does not develop in their progeny until *after* the first year of their life.	

ANSWERS TO THE 25 CLAIMS ADVANCED BY MR. MUNRO HULL FOR THE COWS "CLOVER" AND "TINKERBELL"—*continued.*

10. That this peculiarity is transmissible by *contact*—*i.e.*, natural infection and by vaccination.	A number of cattle, young and old, and of either sex running with "Clover" and "Tinkerbell" have not acquired the so-called tick-killing property, nor have I been successful in transmitting the alleged immunity by vaccination.
11. That the source of infection and vaccination is *not* the state of dermatitis produced by excessive tick-worry.	The skin lesions referred to by Mr. Hull in various terms, and from which he obtained his alleged vaccine, are caused by ticks. By way of proof:—If the cattle are kept free from ticks no such lesions as described by Mr. Hull will develop.
12. That the few odd ticks found to mature on these cattle are not "survivors" but are such as have developed on ordinary cattle, have become displaced without mutilation, and have reattacked these special cattle.	This is incorrect, as in the last experiment the cows "Clover" and "Tinkerbell" were kept in stalls and free from contact with any other animal. Moreover, as my investigations show, it is only on rare occasions and with the greatest difficulty that mature ticks after removal can be made to reattach themselves to the same or another animal, while with partly or fully engorged females this is a physical impossibility.
13. That these odd mature ticks are *never* found on those parts of the cow where ticks abound most in ordinary cattle—*i.e.*, legs, belly, udder, ears, chine, dewlap, or escutcheon. 14. These ticks are most frequently found (in all cases under observation during the last *four* years) on the shoulder, neck, or ribs.	It was found that the ticks possessed no powers of discrimination, as they were found developing and fully-engorged on all parts of the bodies of "Clover" and "Tinkerbell."
15. That when birds are active *no ticks* can be found at all on these cattle.	Although some of the insectivorous birds will eat cattle ticks, close observation shows that ticks cannot be eradicated from any animal by birds.
16. That regular trials, extending without a break for three years, to hatch the eggs laid by the few odd mature females found on these cattle have invariably been failures. 17. That no difficulty was experienced in hatching control eggs from ordinary cattle.	My experience is quite the reverse, as eggs laid by ticks taken from "Clover" and "Tinkerbell" hatch as readily at all seasons of the year as eggs of ticks taken from other cattle.
18. That during the *winter* months these cattle will mature more female ticks than in the summer, when ticks are most active.	There is practically no difference between the nature of the infestation of the so-called proof cattle and that of ordinary cattle during either the winter or the summer months.
19. That temperature tests made in winter with a ground temperature of 53 degrees Fahr. showed that these cattle invariably ranged from 1 degree to 2½ degrees higher than the ordinary cattle tested at the same time.	This is not borne out by my investigations.

ANSWERS TO THE 25 CLAIMS ADVANCED BY MR. MUNRO HULL FOR THE COWS "CLOVER" AND "TINKERBELL"—*continued.*

20. That when these tests were made ticks were wholly absent from the ordinary stock, but were found in small numbers (from 3 to 7) on all the special cattle under test (min. 3, max. 7).	*Vide* answer to No. 18.
21. That I estimate the total possible crop of female ticks per cow for the year to be from 50 to 100 only.	According to the experiment outlined in Answer No. 1, these so-called tick-killing cows will mature some thousands of ticks per year.
22. That if all the stock on a farm or in the State were infected with this peculiarity, the cattle tick would be *exterminated* in a single season.	This statement is refuted by the fact that ticks will readily mature on the so-called proof cattle, for 135 fully-matured female ticks were recently picked off "Tinkerbell" in one day.
23. That at no time has it ever been claimed that larval ticks would not attack or infest these cattle, as stated in Official Report dated 15th May, 1913.	In a letter dated 16th March, 1912, to the Department, Mr. Hull writes that the cattle that have contracted the disease are at all times free from ticks. Moreover, he has frequently referred to these cows as being proof and immune.
24. That *fully developed male* cattle ticks are frequently found on these cattle.	The relative proportion of male to female ticks on "Clover" and "Tinkerbell" was in no way different to that on other cattle.
25. That without females to propagate with, these males (which are obviously perambulatory) are a negative quantity and wholly to be dispensed with in the present case.	

JACK SPANIARDS.

In the "Agricultural News" (Vol. XIV., p. 298) the Curator, Montserrat, in a letter to the Imperial Commissioner, states that the Jack Spaniards (*Polistes annularis*) introduced into Montserrat from St. Vincent in 1910 had for several years been plentiful at Blake's Estate, where they were first established.

Recent reports were to the effect that these insects were spreading to adjoining estates to a distance of four miles to the south-east, and to an equal distance to the north-west. This has been confirmed by a personal visit on the part of the Curator with regard to the spread to the south-east, but in the opposite direction careful search failed to confirm the report.

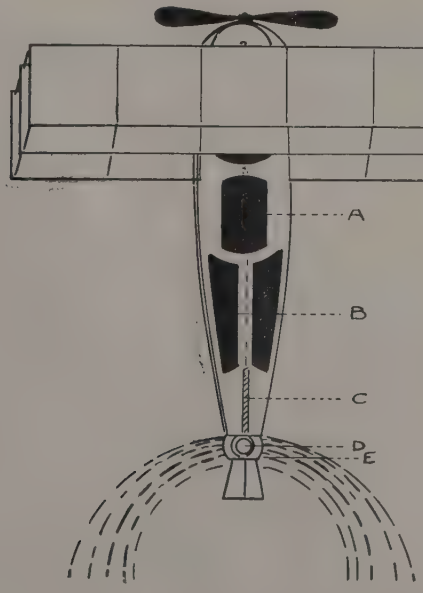
Attempts made in 1914 to redistribute the Jack Spaniard to other parts of the island from Blake's were not successful. The establishment of this insect, and its spread in Montserrat, is of considerable interest, since it has proved to be of value in keeping the cotton worm in check.

In the "Agricultural News" (Vol. XIV., p. 298), an article on West Indian Wasps appeared, in which the importation of Jack Spaniards into Montserrat is mentioned, and an account is there given of a "disease" of the native wasps (*P. crinitus*), which may be responsible for the failure of *Polistes annularis* to establish itself in certain districts in Montserrat, although this matter has not been investigated fully.—"Agricultural News," Barbados.

Science.

FORCED RAIN PRECIPITATION.

We have received the following letter from Mr. F. C. Snodgrass, Melbourne, on the subject of rain-production, a matter which has long engaged the attention of scientific men. Many residents of Queensland will remember experiments made by Professor Pepper to induce a fall of rain by means of a captive kite and by gunfire, which, however, proved unsuccessful. The method proposed by Mr. F. C. Snodgrass appears to be theoretically possible, but theory is not always feasible in practice. Briefly, the idea is based on the action of sea-salt and soda. These substances being finely crushed to a powder and aerially distributed over and above the heavy rain-laden vaporous cloud-masses which move across Australia in the summer-time and during droughts—when stock, grass, cereals, &c., are perishing for want of rain—would, Mr. Snodgrass believes, dissolve, and each particle, assuming an aqueous formation in drops and droplets and amalgamating, would unloose the cloud-rain bonds of Nature, as it sinks through it and produce a rain precipitation as usual. Should this theory be borne out, on trial tests, it is obvious that it will revolutionise the pastoral and other rural industries, replenishing watercourses, reservoirs, and dams, and refreshing the natural grasses and artificial crops on the limited areas passed over.



REFERENCES TO DIAGRAM.

A—Crew accommodation.
B—Storage bunkers, on each side.
C—Revolving screw-feeding cylinder.
D—Revolving perforated drum.
E—Distributor.

Dr. F. M. Gellatly, Director of the Science and Industry Institute, states that he is much interested in the matter and will place it before the Executive.

These things will serve to convince people of the apparent practicability of the scheme pending the trial test. Should this prove successful, the values and output of all pastoral and farming properties would be increased very greatly, as would also the revenue of the Commonwealth, depleted as it is by war conditions.

In the Cloncurry district, the papers report stock to be dying by thousands through want of rain and consequent drought conditions; and these conditions prevail in other parts of the Commonwealth. In 1914, Mr. S. Kidman lost 70,000 head of cattle by drought. These facts speak for themselves.

The necessary machinery would be driven by cogs, cog-wheel, and chain gearing along a shaft from the engine to a revolving distributor as per diagram. In December, 1917, and August, 1918, Mr. Snodgrass says, he wrote two letters about this method in the "Pastoral Review," and had no adverse criticism.

Being fifty-seven years of age, and possessing only small private means, Mr. Snodgrass can go no further in the matter, and simply awaits the action of the authorities on the subject, as well as of all interested.

(This method has no connection with Ballsillie's Patent nor with any other.)

ECONOMY IN USING POTATOES.

An article appears in the "Journal of the Board of Agriculture" of England and Wales on economy in using potatoes. Trial has shown that the most common method of cooking potatoes—paring, then boiling after placing the pared tubers in cold water—is the most wasteful method practised. This is so for three reasons: first, not only the skin, but the surface layer and perhaps 10 per cent. of the flesh are removed by thick paring, partly owing to deeply sunk eyes and surface irregularity; the total loss may, indeed, amount to as much as 20 per cent. of the whole tuber—or 1 lb. in every 5 lb. The surface layers, which are wasted, contain a larger percentage of solids than the remainder; and lastly, the subsequent boiling dissolves the soluble ingredients of the potato and also breaks down the outer surface into the water—which is thrown away.

Experiments on the subject have shown that pared potatoes put into cold water and boiled lost 15.8 per cent. of their protein or flesh-forming substances, 18.8 per cent. of their ash or mineral matter, and some 3 per cent. of their carbohydrates or starch. Plunged at once after paring into boiling water and boiled, they lost 8.2 per cent. of their protein, about 18 per cent. of their ash, and a small amount of their starch. On the other hand, when boiled in their jackets, potatoes lost only 1 per cent. of their protein, a little over 3 per cent. of their ash, and practically none of their starch whether plunged in cold or hot water at the start.

It is clear, therefore, that if pared potatoes are placed direct in boiling water, the loss in boiling is very much reduced compared with the usual methods—placing in cold water; steaming instead of boiling also reduces the loss; while boiling or steaming in their jackets reduces all losses to a minimum—both the boiling losses and the primary 20 per cent. loss due to paring are almost wholly avoided.

Considering the facts already outlined, in cooking for the table, potatoes should be boiled or steamed in their jackets. Slow cooking is desirable so that the skin does not bake on to the flesh and so cause loss. The skin should be pricked or cut before baking to permit the escape of steam. If because of injuries to the surface or for any other reason, potatoes must be pared, they should be cooked by steaming, or by cooking in the smallest possible quantity of water, which should be boiling when the potatoes are put in. The water should not be thrown away but should be used as a basis for soups. The same applies to the cooking of beans. The loss in boiling is reduced if salt is added to the water.

As a general rule with all vegetables, it is more economical to steam them rather than to boil them. The information given above refers primarily to English potatoes, but the general principles hold good for sweet potatoes and yams and other West Indian vegetables. In view of the high cost of living in the West Indies and the possible shortage of food in the future, it will be well to bear the foregoing facts in mind, as it will be seen that the preparation of vegetables for the table is in many cases accompanied by a very considerable loss of nutrient material.

General Notes.

SOCIETIES, SHOW DATES, ETC.

The Rockhampton Agricultural Society's Show dates have been fixed for the 19th, 20th, and 21st June, 1919.

LONDON QUOTATIONS.

There was a slump in the market on 16th January in honey, and 1,144 cases of Australian honey offered at auction were all bought in at 150s. per cwt.

Cotton, on the same date, was quoted at 17.03d. per lb.

Rubber: Para rubber sold at 2s. 6¼d. and Plantation at 24⅞d. per lb.

A REMEDY FOR PARASITICAL BRONCHITIS IN CALVES.

Mr. E. H. Hallam, M.R.C.V.S., lately visited a farm at Winora for the purpose of examining calves, and from a personal examination found that they were suffering from parasitical bronchitis, commonly known as "Hoose." He recommended the following treatment:—Turpentine, 1 tablespoonful; linseed oil, 2 tablespoonfuls, to be given three times a week.

REMEDY FOR THE STING OF THE NETTLE TREE.

"Bushman" Pomona, writes:—Many selectors and others working in the bush will often get stung by the nettle tree (Gympie) which causes hours of intense pain. I have tried many remedies, but the only one I have found to give relief is Venice turpentine. It should be smeared over the injured part and then a bandage applied. This will deaden the pain and make life tolerable.

EXPORT OF FRUIT, FARM PRODUCE, AND VEGETABLES FROM BRISBANE DURING DECEMBER, 1918.

To New South Wales, 3,463 cases of bananas, 7,346 cases of pineapples, 796 cases of passion fruit, 684 cases of cucumbers, 11,000 cases of mixed fruit, and 1,464 cases of canned pines. The December exports from Brisbane to Victoria comprised 5,720 cases of bananas, 1,365 cases of pineapples, 1,786 canned pines, and 600 cases mixed fruit. The exports oversea for the month were 2,220 cases pineapples, 151 cases jam, and 2,000 cases marmalade.

IMPORTS FROM THE SOUTH.

Imports from the South included 24,884 cases fruit, 18,180 bags potatoes, and 4,045 bags onions.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JANUARY, 1919.

Article		JANUARY. Prices.
Bacon	lb.	9d. to 11d.
Barley	bush.	5s. 6d. to 6s.
Bran	ton	£6 to £7
Broom Millet	"	£50 to £75
Broom Millet (Sydney price)	"	£80
Butter (First Grade)	cwt.	172s. 5d.
Chaff, Mixed	ton	£10 to £14 10s.
Chaff, Oaten	"	£9 to £11 5s.
Chaff, Lucerne	"	£10 5s. to £17 6s. 8d.
Chaff, Wheaten	"	£7 to £10 15s.
Cheese	lb.	11d. to 11½d.
Flour	ton	£12
Hams	lb.	1s. 6d. to 2s.
Hay, Oaten	ton	...
Hay, Lucerne	"	£4 to £12 5s.
Hay, Wheaten	"	...
Honey	lb.	3d. to 5d.
Maize	bush.	7s. 2d. to 8s. 8½d.
Oats	"	3s. 10d. to 4s.
Onions	ton	£12 10s. to £13 10s.
Peanuts	lb.	6d. to 7d.
Pollard	ton	£7 to £8
Potatoes	"	£24 to £34
Potatoes (Sweet)	cwt.	6s. to 7s.
Pumpkins (Cattle)	ton	£15
Eggs	doz.	10d. to 1s. 5d.
Fowls	per pair	3s. 2d. to 7s. 9d.
Ducks, English	"	3s. 6d. to 4s. 3d.
Ducks, Muscovy	"	7s. to 9s. 2d.
Geese	"	8s. 6d. to 10s.
Turkeys (Hens)	"	12s. to 13s. 6d.
Turkeys (Gobblers)	"	18s. 5d. to 42s.
Wheat (Milling)	bush.	5s. 6d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per dozen bundles	...
Beans, per sugar-bag	3s. to 5s.
Beetroot, per dozen bundles	1s. to 2s.
Cabbages, per dozen	8s. to 14s.
Carrots, per dozen bunches	1s. to 2s.
Cucumbers, per dozen	1s. to 2s. 3d.
Lettuce, per dozen	...
Marrows, per dozen	4s. to 7s. 6d.
Parsnips, per dozen bunches	9d. to 2s.
Peas, per sugar-bag	3s. 6d. to 8s. 6d.
Sweet Potatoes, per sugar-bag	6s. to 7s. 6d.
Pumpkins (table), per cwt.	5s. to 13s.
Tomatoes, per quarter-case	4s. to 10s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	JANUARY. Prices.
Bananas (Queensland), per case	14s. to 20s.
Bananas (Tweed River), per case	14s. to 27s.
Bananas (Fiji), per bunch	Nominal
Bananas (G.M.), per bunch	Nominal
Bananas (G.M.), per case	Nominal
Cherries, per 12lb. box	10s. to 12s.
Cucumbers, per double case	4s. to 8s.
Lemons (local) per bushel-case	20s. to 22s.
Mandarins, per bushel-case	...
Mangoes, per bushel-case	8s. to 11s.
Oranges (Navel), per case	10s. to 15s.
Oranges (Local), per case	16s. to 18s.
Oranges (Queensland), per case	...
Papaw Apples (Queensland), per half-case	10s.
Passion Fruit (Queensland), per bushel-case	8s. to 13s.
Pineapples (Queens), per double-case	10s. to 14s.
Pineapples (Ripleys), per double-case	7s. to 8s.
Pineapples (Common), per double-case	7s. to 8s.
Tomatoes, per half-case	4s. to 7s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JANUARY. Prices.
Apples, Eating, per bushel-case	8s. to 17s. 6d.
Apples, Cooking, per bushel-case	6s. to 8s. 9d.
Apricots, per quarter-case	5s. to 10s. 6d.
Bananas (Cavendish), per dozen	3½d. to 6½d.
Bananas (Sugar), per dozen	4d. to 5d.
Cherries, per box	8s. to 12s.
Citrons, per hundredweight	7s. to 8s.
Cocoanuts, per sack	15s. to 25s.
Figs, per dozen boxes	6s. to 10s.
Custard Apples, per quarter-case	...
Grapes, black, per lb.	2d. to 3d.
Grapes, white, per lb.	1½d. to 2½d.
Lemons (Lisbon), per case	14s. to 16s.
Mandarins, per case	6s. to 9s.
Mangoes, (market glutted) per case	1s. to 5s.
Nectarines, per case	6s. to 9s.
Oranges (Navel), per case	15s.
Oranges (Seville), per hundredweight	12s.
Oranges (Other), per case	3s. to 5s. 6d.
Papaw Apples, per quarter-case	1s. 6d. to 3s. 6d.
Peaches, per quarter-case	4s. to 9s. 6d.
Peanuts, per lb.	6d. to. 7d.
Persimmons, per quarter-case	3s. 6d. to 4s.
Pineapples (Ripley), per dozen	3s. to 6s. 5d.
Pineapples (Rough), per case	6s. to 9s.
Pineapples (Smooth), per dozen	1s. 6d. to 2s. 6d.
Plums, per case	4s. to 8s. 6d.
Rockmelons, per dozen	1s. 6d. to 8s.
Sugar-melons, per dozen	4s. to 12s.
Strawberries, per dozen boxes	...

TOP PRICES, ENOGGERA YARDS, DECEMBER, 1918.

Animal.	DECEMBER. Prices.
Bullocks	£22 5s. to £30 15s.
Cows	£16 7s. 6d. to £20 10s.
Merino Wethers	46s. 3d.
Crossbred Wethers	48s. 6d.
Merino Ewes	43s. 6d.
Crossbred Ewes	32s. 6d.
Lambs	31s.
Pigs (Bacon)	70s.
Pigs (Porkers)	56s.
Pigs (Slips)	22s. 3d.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER, 1918, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING DECEMBER, 1918 AND 1917, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL. Dec.	No. of Years' Records.	TOTAL RAINFALL. Dec., 1918.	Dec., 1917.
North Coast.				
	In.		In.	In.
Atherton	7·88	17	4·12	9·88
Cairns	9·55	36	4·94	13·14
Cardwell	8·69	46	3·90	12·27
Cooktown	7·26	42	4·71	21·68
Herberton	5·71	31	3·81	7·39
Ingham	7·46	26	5·21	18·26
Innisfail	12·76	37	4·73	25·33
Mossman	13·79	10	10·97	15·37
Townsville	5·82	47	0·80	11·03
Central Coast.				
Ayr	3·87	31	2·31	8·22
Bowen	4·53	47	0·85	16·05
Charters Towers ...	3·69	36	0·35	3·09
Mackay	7·13	47	0·25	13·19
Proserpine	9·68	15	1·57	19·30
St. Lawrence ...	4·46	47	0·43	8·37
South Coast.				
Biggenden	4·51	...	0·74	3·28
Bundaberg	4·47	35	1·38	3·02
Brisbane	4·96	67	0·88	5·19
Childers	5·17	23	0·70	2·64
Crohamhurst ...	7·32	25	3·02	7·38
Esk	4·36	31	1·54	6·17
Gayndah	3·83	47	1·25	2·91
Gympie	5·90	48	0·69	6·91
Glasshouse M'tains	7·65	10	1·92	9·14
Kilkivan	4·28	39	1·38	4·39
Maryborough ...	4·52	47	2·24	5·21

Divisions and Stations.	AVERAGE RAINFALL. Dec.	No. of Years' Records.	TOTAL RAINFALL. Dec., 1918.	Dec., 1917.
South Coast—continued:	In.		In.	In.
Nambour	6·46	22	3·14	7·74
Nanango	3·66	36	1·83	4·54
Rockhampton ...	4·45	31	2·91	3·09
Woodford	5·45	31	1·86	5·56
Darling Downs.				
Dalby	3·13	48	3·84	4·07
Emu Vale	3·52	...	3·52	5·05
Jimbour	3·15	...	2·32	3·26
Miles	2·53	33	0·56	1·96
Stanthorpe ...	3·49	45	3·27	5·99
Toowoomba ...	4·22	46	2·33	6·10
Warwick	3·47	31	2·57	4·95
Maranoa.				
Roma	2·34	44	0·27	2·34
State Farms, &c.				
Bungeworgorai ...	3·12	4	0·43	3·10
Gatton College ...	3·48	...	1·57	7·14
Gindie	...	...	Nil	2·13
Hermitage ...	2·80	...	3·31	4·38
Kairi	10·29	4	5·61	10·55
Sugar Experiment Station, Mackay	9·02	...	0·33	13·04
Warren	4·18	4	2·10	3·28

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for December, 1918, and for the same period of 1917, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1919.	JANUARY.		FEBRUARY.		MARCH.		APRIL.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·57	6·45	5·21	6·42	5·41	6·20	5·58	5·47
2	4·58	6·46	5·22	6·42	5·42	6·19	5·59	5·46
3	4·59	6·46	5·23	6·41	5·42	6·18	5·59	5·44
4	5·0	6·46	5·24	6·41	5·43	6·17	6·0	5·43
5	5·0	6·46	5·24	6·40	5·44	6·16	6·0	5·42
6	5·1	6·47	5·25	6·39	5·44	6·15	6·1	5·41
7	5·2	6·47	5·26	6·39	5·45	6·14	6·1	5·40
8	5·2	6·47	5·27	6·38	5·45	6·13	6·2	5·39
9	5·3	6·47	5·28	6·37	5·46	6·12	6·2	5·38
10	5·3	6·47	5·28	6·36	5·46	6·11	6·3	5·37
11	5·4	6·47	5·29	6·36	5·47	6·10	6·3	5·36
12	5·5	6·47	5·30	6·35	5·48	6·9	6·4	5·35
13	5·6	6·47	5·31	6·35	5·48	6·8	6·4	5·35
14	5·6	6·47	5·31	6·34	5·49	6 7	6·4	5·34
15	5·7	6·47	5·32	6·33	5·49	6·6	6·5	5·33
16	5·8	6·47	5·33	6·32	5·50	6·5	6·5	5·32
17	5·9	6·47	5·33	6·31	5·50	6·4	6·6	5·31
18	5·10	6·47	5·34	6·30	5·51	6·3	6·6	5·30
19	5·10	6·47	5·35	6·29	5·51	6·2	6·7	5·29
20	5·11	6·47	5·35	6·28	5·52	6·1	6·7	5·28
21	5·12	6·46	5·36	6·28	5·52	6·0	6·8	5·27
22	5·13	6·46	5·36	6·27	5·53	5·59	6·8	5·26
23	5·14	6·46	5·37	6·26	5·53	5·58	6·9	5·25
24	5·15	6·45	5·38	6·25	5·54	5·57	6·9	5·24
25	5·16	6·45	5·38	6·24	5·54	5·56	6·10	5·23
26	5·16	6·45	5·39	6·23	5·55	5·55	6·10	5·22
27	5·17	6·44	5·40	6·22	5·56	5·53	6·11	5·21
28	5·18	6·44	5·41	6·21	5·56	5·52	6·11	5·20
29	5·19	6·43	...	...	5·57	5·50	6·12	5·19
30	5·20	6·43	..	...	5·57	5·49	6·12	5·18
31	5·21	6·42	...	...	5·58	5·48	...	...

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania.

			H.	M.	
2	Jan.	● New Moon	6	24	p.m.
9	,,	☾ First Quarter	8	55	p.m.
16	,,	○ Full Moon	6	45	p.m.
24	,,	☽ Last Quarter	2	22	p.m.

The Moon will be nearest the earth on the 11th about 8 p.m., and farthest from the earth on 24th about 9 a.m.

1	Feb.	● New Moon	9	7	a.m.
8	,,	☾ First Quarter	4	52	a.m.
15	,,	○ Full Moon	9	38	a.m.
23	,,	☽ Last Quarter	11	48	a.m.

The Moon will be nearest the earth on 5th about midday, and farthest away on the 21st about 6 a.m.

2	Mar.	● New Moon	9	12	p.m.
9	,,	☾ First Quarter	1	14	p.m.
17	,,	○ Full Moon	1	41	a.m.
25	,,	☽ Last Quarter	6	34	a.m.

The Moon will be nearest the earth on the 4th about midnight, and farthest away on the 20th about 11p.m.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun will rise and set about 4 minutes later than at Brisbane, and at Oontoo (longitude 141 degrees E.) about 48 minutes later.

At St. George, Cunnamulla, and Thargomindah the times of sunrise and sunset will be about 18 m., 30 m., and 38 minutes respectively, later than at Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

Orchard Notes for March.

THE SOUTHERN COAST DISTRICTS.

The marketing of the main crop of pineapples will continue to occupy the attention of growers; and as it is probable that the plantations have been allowed to get somewhat dirty during the previous month, they should be cleaned up as soon as ever the crop has been got off. The fruit of the new crop of citrus fruit will be showing signs of ripening towards the end of the month; and as the fruit during this period of its growth is very liable to the attack of insect pests of various kinds, it is important that steps should be taken to prevent loss arising from this cause as far as possible.

Large sucking moths of several kinds attack the fruit as soon as it shows signs of ripening; and as they always select the first fruit that shows signs of colouring, it is a good plan to gather a few forward fruit and to ripen them up quickly by placing them on a barn floor, and covering them up with bags or straw. They will turn colour in a few days, and develop the characteristic scent of the ripening fruit. The fruit so treated should be hung up in conspicuous places in the orchard as trap-fruit, as not only will it attract the moths, but also the fruit-flies. The moths will be found clustered round the trap-fruits in large numbers, and can then be easily caught and destroyed. Fruit-fly will also puncture such fruit; and if the fruit is destroyed before the larvæ reach maturity, a later crop of these insects is prevented from hatching out. Fruit-flies may also be caught in large numbers by means of such artificially ripened fruits. The fruits are smeared with tanglefoot, and hung about the orchard. The fly, attracted by the colour, settles on the fruit, and is caught in a similar manner to house-flies on specially prepared sticky paper. These simple remedies, if carefully carried out, will result in the destruction of large numbers of sucking moths and fruit-flies.

The yellow peach-moth that does such damage to peaches in spring, and that attacks corn, sorghum, cotton bolls, custard apples, and many other plants and fruits, often does a lot of damage to citrus fruits. It acts in a very similar manner to the second and later generations of the Codling moth of pomaceous fruits, in that it lays its eggs where two fruits touch, under the shelter of a leaf on the fruit, at the stem end of the fruit, and, in the case of navel oranges, in the navel itself; in fact, anywhere that there is a likelihood of the egg not being disturbed. The egg hatches out into a small spotted caterpillar, which eats its way into the fruit, causing it to ripen prematurely, and fall off. Where two fruits touch, it often eats into and destroys both, and it frequently leaves one fruit to go and destroy a second. It is a very difficult insect to deal with, owing to the number of fruits and plants on which it lives; but, as far as citrus fruits are concerned, the best remedy is undoubtedly to spray the fruit with a remedy that will destroy the young insect when it starts to eat the skin of the fruit. Bordeaux mixture has been found efficacious, but I am of opinion that spraying with Paris green and lime, Kedzie's mixture, or arsenite of lead, will also have good results. The latter poison is, in my opinion, well worth giving a thorough test, as it sticks to the fruit and leaves for a long time. Bordeaux mixture, either alone or in conjunction with Paris green or Kedzie's mixture, is, however, a good remedy, as not only will it destroy the larvæ or prevent the moth from attacking the tree, but it is also the best remedy for black brand or melanose, as well as tending to keep all other fungus pests in check. Fight fruit-fly systematically—both by means of the sticky fruit already recommended and by gathering all fly-infested fruit, such as guavas, late mangoes, kumquats, &c., as well as any oranges or mandarins that may have been infested, as if kept in check now there will be little loss throughout the season. A little fruit will be marketed towards the end of the month. See that it is gathered and sweated for seven days before marketing, and

don't gather it too immature. Beauty of Glen Retreat mandarins are often gathered and marketed as soon as they show signs of colouring. They are then as sour as a lemon, and anyone who is unlucky enough to buy them will steer off mandarins for some time to come. This variety should not be gathered till thoroughly ripe, as when marketed in an immature state it spoils the market, as it puts people off eating citrus fruit.

Clean up the orchard after the summer rains, and have everything ready for the marketing of the crop. See that there is a good supply of clean, dry case timber on hand, as one of the greatest sources of loss in shipment is packing fruit in green cases.

Strawberry planting can be done throughout the month. Plant such berries as Federation on the lowest ground, and Aurie, Anetta, Trollop's Victoria, and Glenfield Beauty on warm, well-drained soils. Prepare the land thoroughly, so that it is in perfect tilth, and in a fit state to retain moisture well; as on this, as much as anything, the success of the crop depends. Where new orchards are to be planted, get the land ready—not the clearing, which should have been done months ago, but the working of the land, as it is advisable to get it thoroughly sweetened before putting the trees in.

THE TROPICAL COAST DISTRICTS.

The Notes for February apply equally to March. See that bananas are netted—keep down weed growth, and market any sound citrus fruits. Clean up the orchards as well as possible, and keep pines clean. Get land ready where new orchards are to be set out, as tree-planting can be done during April and May. Pines and bananas can still be planted, as they will become well established before winter.

THE SOUTHERN AND CENTRAL TABLELANDS.

Finish the gathering of the later varieties of deciduous fruits, as well as grapes. Clean up the orchard, and get ready for winter. Get new land ready for planting; and where there are old, dead, or useless trees to be removed, dig them out and leave the ground to sweeten, so that when a new tree is planted to replace them the ground will be in good order.

In the drier parts, where citrus trees are grown, keep the land well worked, and water where necessary.

Farm and Garden Notes for March.

FIELD.—Take every opportunity of turning up the ground in readiness for sowing and planting winter crops. The main crop of potatoes should at once be planted. As the growth of weeds will now be slackening off, lucerne may be sown on deeply cultivated soil. The latter should be rich and friable, with a porous subsoil. The land should be thoroughly pulverised. Do not waste time and money in trying to grow lucerne on land with a stiff clay subsoil. Prepare the land a couple of months before sowing, care being taken to cross plough and harrow before the weeds have gone to seed. This ensures a clean field. Sow either broadcast or in drills. In the former case, 20 lb. of seed will be required; in the latter, 10 lb. A good stand of lucerne has been obtained with less quantities. Should weeds make their appearance before the plants have sent down their tap roots, mow the field. Before they can again make headway enough to do any damage, the lucerne will be strong enough to hold its own against them. Harrow and roll the land after mowing. Gather all ripe corn. It is now too late to sow maize, even 90-Day, with any certainty of

harvesting a crop of grain. Rye grass, prairie grass, Rhodes grass, oats, barley (in some districts, wheat), sorghum, vetches, carrots, mangolds, and Swede turnips may be sown. In Northern Queensland, sow tobacco seed, cowpea, carob beans, sweet potatoes, opium poppy, &c. Sow anatto, jack fruit, and plant kola-nut cuttings. Some temperate-zone vegetables may be planted, such as egg plant, potatoes, &c. Coffee-planting may be continued. Harvest kafir corn and paddy. Cotton picking will now be in full swing. Pick cleanly, and expose to the sun for a few hours before storing or baling. Pick none but fully ripe bolls.

FLOWER GARDEN.—Now is the time to plant out bulbs. A complete garden could be furnished with these charming plants, which are to be had in every colour and variety. Amongst the many are—Amaryllis, anemone, arum, babiana, crinum, crocus, freesia, ranunculus, jonquils, iris, ixias, gladiolus, narcissus, Jacobean lilies, tigridia, tritonia.

All bulbs like well-drained, somewhat sandy soil, with a plentiful admixture of leaf mould. Herbaceous plants and annuals which it is intended to raise from seed should be sown this month. Such are antirrhinums (snapdragon), asters, cornflowers, dianthus, larkspurs, daisies, cosmea, candytuft, lupins, gaillardias, godetia, mignonette, poppies, pansies, phlox, sweet peas. Cannas now planted will require plenty of food in the shape of liquid manure. Put in cuttings of carnations. Chrysanthemums require attention in the way of disbudding, staking, watering with liquid manure, &c. Growers for exhibition will thin out to a few buds and protect the flowers from rain and sun. Dahlias should be looking well. To secure fine blooms, disbudding should be done.

Now, as to climbers which may now be planted. These are—*Allamanda Schotii* (beautiful yellow), *Antigonon leptopus*, a charming cerise-coloured climber; *Aristolochia elegans*, handsome as an orchid and easily grown; *Aristolochia ornithocephala* (Dutchman's Pipe), very curious, large, always attracts attention; *Asparagus plumosa* grows in any shady place; *Beaumontia grandiflora*, splendid white flower, grand for a fence, will grow 50 ft. high; Bignonias of several kinds; Bougainvilleas, with their splendid leafy pink and purple flowers, rapidly clothe a fence or unsightly shed with a blaze of blossom; *Quisqualis indica*, a fine creeper, flowers pink, changing to white; Wistaria, purple and white. Most beautiful is the *Bauhinia scandens*, rarely seen about Brisbane. We grew a plant of this climber at Nundah, and it soon closed in the front of the veranda for a distance of over 80 ft. The leaves are very small, and in the flowering season it presents almost a solid mass of beautiful round bunches of blossoms, something like the hawthorn bloom—pink and white. It seeds freely, but the seeds are difficult to germinate, and when they have produced a plant it is still more difficult to rear it. A rooted sucker from the main stem will in all probability grow.

KITCHEN GARDEN.—During this month a very large variety of vegetable seeds may be sown in readiness for planting out where necessary in the autumn, which begins on the 20th of March. All unoccupied land should be roughly dug, and, when required, add well-decomposed manure. Transplant cabbage, cauliflower, celery, &c. Sow French and broad beans, beet, carrot, turnips, radish, cabbage, cauliflower, cress, peas, onions, mustard, &c. Former sowings should be thinned out and kept clear of weeds. Mulch round melon and cucumber beds with a good dressing of long stable manure, as it assists in keeping the fruit clean and free from damp. Cucumbers, melons, French beans, and tomatoes should be looked for every day and gathered, whether required or not, for if left on the vines to perfect their seeds, the plants will soon cease to be productive, or will form inferior, ill-shaped, and hence unsaleable fruit.